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René Descartes REGULÆ AD DIRECTIONEM INGENII
RULES FOR THE DIRECTION OF THE NATURAL INTELLIGENCE

A bilingual edition of the Cartesian treatise on method

Edited and translated by George Heffernan

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Meiner lieben Frau,
Kim Young-Hee,
in Verehrung und Dankbarkeit gewidmet:

'O felix hominum genus,
si vestros animos amor,
quo caelum regitur, regat.'

Boethius, *Consolatio philosophiae*, bk. II, c. 8, ll. 28–30

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PREFACE

Four hundred years after the birth of René Descartes, the present volume now makes available, for the first time in a bilingual, philosophical edition prepared especially for English-speaking readers, his *Regulæ ad directionem ingenii / Rules for the Direction of the Natural Intelligence*, the Cartesian treatise on method. This unique edition contains an improved version of the original Latin text, a new English translation intended to be as literal as possible and as liberal as necessary, an interpretive essay contextualizing the text historically, philologically, and philosophically, a comprehensive index of Latin terms, a key glossary of English equivalents, and an extensive bibliography covering all aspects of Descartes' methodology. For one cannot understand Descartes without understanding the early Descartes; one cannot understand the early Descartes without understanding the *Regulæ*; and one cannot understand the *Regulæ* without understanding a philosophical edition thereof. Hence this project.

This is the third in my series of bilingual editions of the major works of Descartes. The *Meditationes de prima philosophia / Meditations on First Philosophy* (1990) was merely exploratory. The *Discours de la méthode / Discourse on the Method* (1994) showed how very little effort is required to misunderstand this seemingly facile work. The *Regulæ ad directionem ingenii / Rules for the Direction of the Natural Intelligence* should make it clear that there is no seamless transition between the early and the mature Descartes. Thus these editions have also been done, not by accident, but by intention, in reverse chronological order. The motivation for doing them was not a drive to do research on Descartes for its own sake, but rather a growing skepticism in regard to certain currently fashionable self-styled 'postmodernist' interpretations both of 'modernity' in general as a menacing monolith and of Descartes in particular as a rationalist extremist. But my thoughts on these topics I shall largely reserve for future forays.

With gratitude I wish to acknowledge the assistance of the following individuals and institutions in the preparation of the present volume.

The Department of Philosophy of the University of Bonn welcomed me as Visiting Researcher during the summer semesters of 1994 and 1995. The Department of Philosophy of Boston College bestowed the status of Visiting Scholar on me for the academic years 1993–1994 and 1994–1995, and Richard Cobb-Stevens has been especially helpful in seeing to it that I continue to enjoy the use of all the excellent scholarly facilities of his institution. The 'Geist der Gründlichkeit' exhibited by Hubertus Busche (University of Bonn) has been a source of constant admiration and inspiration. My former professors at the Catholic University of America – especially Robert Sokolowski, Thomas Prufer, and Dominic O'Meara – taught me, among other things, that it is foolish to think that one can philosophize effectively without trying one's best to understand difficult texts. Lisa Marie Esposito-Buckley filled in a few gaps in my knowledge of the fragments of the ancient Stoics. Bill Falcetano consistently shows that one is a philosopher, not because of whom one knows, but because of what one knows. Daniel Garber (University of Chicago) displayed immediate, informed enthusiasm for the project upon learning of it. Klaus Kaehler (University of Cologne), J. N. Mohanty (Temple

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All my dedications have been meant benevolently, but this holds especially for that of the present volume, which is dedicated to my loyal wife, Young-Hee Kim, as an – inadequate – expression of appreciation for all that she has done over the years to bring and to hold us together:

swem nie von liebe leit geschach,
dem geschach ouch liep von liebe nie.
liep unde leit diu wären ie
an minnen ungeschieden.[*]

Andover–Bad Godesberg
June 1, 1994–December 31, 1995

George Hefferman

[*] Gottfried von Straßburg, *Tristan*, ll. 204–207.

INTRODUCTION

A CONTEXTUALIZATION OF THE TEXT

'He [Descartes] has not published his method,
but rather, as he himself remarks,
he only intended to write about it and to give examples of it.
Therefore those who are too satisfied with what he has published
and who think that they possess his method
are greatly mistaken.' [1]

– Leibniz –

A Brief Protreptic: The Rationale for this Edition

As is well known, René Descartes did not publish his most elaborate set of reflections on method, namely, the *Regulæ ad directionem ingenii* / *Rules for the Direction of the Natural Intelligence*. Thus the present edition is justified first and foremost by the fact that it is – four hundred years after the birth of its author – the first bilingual Latin-English edition of that work ever to be published. Moreover, although there are English editions and translations of the *Regulæ* accessible in the same volumes with other works of Descartes, there is not now available even any other edition or translation of this work in the form of an independent publication in English.[2] Finally, whereas the 'usual' works of Descartes, namely, the *Discourse on the Method* and the *Meditations on First Philosophy*, have traditionally provided the starting-points for an understanding of his philosophy, it is hard to discern how the lack of a readily accessible and separately available English edition or translation of the *Regulæ* – which are, after all, sui generis – can be exerting any positive force on the development of Cartesian studies. This edition intends to fill this lacuna.

Indeed, the aforementioned preference, according to which there is no real proportionality in the level of attention focused on the *Discours* and on the *Meditations*, on the one hand, compared with the *Regulæ*,[3] on the other hand, is nothing but a prejudice for which there is hardly any philosophical justification. For it is generally safe to say that those who one-sidedly orient themselves on the *Meditations* in their study of

[1] See G. W. Leibniz, *Nonnulla quædam ... circa vitam et doctrinam Cartesii*. *Die philosophischen Schriften von Gottfried Wilhelm Leibniz* (7 vols.), ed. C. I. Gerhardt (Berlin, 1875–1890), vol. IV (1880), p. 310: '... ipse in scriptis suis non exposuit, quemadmodum nec publicavit methodum suam, sed tantum de ea scribere eiusque specimina dare voluit, ut ipse observat. Itaque valde falluntur, qui his quæ edidit, nimis contenti sunt, methodumque eius se habere arbitrantur.'

[2] Even the standard one-volume edition of Descartes' works does not contain the complete text of the *Regulæ*. See John Cottingham, Robert Stoothoff, and Dugald Murdoch (trans.), *Descartes: Selected Philosophical Writings* (Cambridge, 1988). Only Rules I–XII are given on pp. 1–19.

[3] Or compared with the *Principles of Philosophy* – but that is another matter altogether.

Descartes' philosophy tend to get the impression that he is almost exclusively interested in metaphysical questions such as the existence of God and the real distinction between the human soul and the body – even though, the better one knows this work, the more one can appreciate that this too is a highly selective interpretation of it. Moreover, as far as the *Discourse* is concerned, the hardest thing to do while reading it is to keep telling oneself, again and again and again, that it really is mainly and mostly about method – the irony being that it is actually the *Regulæ* which constitute Descartes' authentic treatise on method.

As a matter of fact, to look for *the Cartesian method* mainly and mostly in 'the principal rules of the method' that are proposed in the *Discourse on the Method* is a fundamentally misguided enterprise.[4] For Descartes' own contemporaneous correspondence unambiguously indicates that the *Discourse* was hardly intended to represent an exhaustive – or even a systematic – presentation of his method.[5] On the contrary, a repeatedly recurring message of the letters is that the purpose of the *Discourse on the Method* is to reveal just enough of the method to render the *Essays of the Method* accessible.[6] In other words, it had simply never been the main aim of the *Discourse on the Method* to explain adequately the method per se.[7]

After all, the *Discourse* has the narrative character of a linked series of reports on research done, research being done, and research to be done. But, of the research done, only some was being published, whereas some was not, and some could not be. For, on the one hand, the *Dioptrics*, the *Meteorology*, and the *Geometry* are examples of research that Descartes was publishing (1637), and he wrote the *Discourse* as 'a preface'[8] to accompany them, to explain some aspects of their methodology, and to facilitate their acceptance. And, on the other hand, *The World*, on which Descartes had worked from 1630 to 1632, which he had abandoned in 1633, and on which he reports in the fifth part of the *Discourse*, was not being published because it was deemed unpublishable – due to

[4] Still, few readers seem to notice that, according to the preface of the work, the best that one can hope to find there is 'les principales règles de la méthode'. See René Descartes, *Œuvres de Descartes*, ed. Charles Adam and Paul Tannery (Paris, 1964–1976), vol. VI, p. 1. Hereafter the works of Descartes are usually referred to by 'AT', volume, and page.

[5] See, e.g., the Interpretive Essay of my recent edition of the *Discourse*, namely, *René Descartes: Discours de la méthode pour bien conduire sa raison et chercher la vérité dans les sciences / Discourse on the Method of Conducting One's Reason Well and of Seeking the Truth in the Sciences, A Bilingual Edition and an Interpretation of René Descartes' Philosophy of Method* (Notre Dame/London, 1994), p. 153 ff.

[6] Some key letter commentaries on the *Discourse* are: (1) Letter to Huygens, Nov. 1, 1635, (2) To Mersenne, Mar., 1636, (3) To Mersenne, Feb. 27, 1637 (?), (4) To Mersenne, May (end), 1637, (5) To Unknown, May (end), 1637, and (6) To Vatier, Feb. 22, 1638. See AT, I, 591–592, 338–341, 348–351, 366–368, 369–370, and 558–565, respectively. The best edition of the correspondence of Descartes in English is: John Cottingham, Robert Stoothoff, Dugald Murdoch, and Anthony Kenny (trans.), *The Philosophical Writings of Descartes*, vol. III: *The Correspondence* (Cambridge, 1991). This edition also contains a handy list of pertinent references to the *Discourse* (p. 391).

[7] See, e.g., Letter to Mersenne, Feb. 27, 1637 (?) (AT, I, 349): 'But I have not been able to understand very well your objection concerning the title; for I do not put *Treatise on the Method* [*Traité de la Méthode*], but rather *Discourse on the Method* [*Discours de la Méthode*], which is the same thing as *Preface or Notice concerning the Method* [*Préface ou Avis touchant la Méthode*], in order to show that I do not intend to teach the method, but rather only to discuss it.'

[8] See Letter to Huygens, Nov. 1, 1635 (AT, I, 592): '... une préface ...'. Moreover, To Mersenne, Feb. 27, 1637 (?) (ibid., p. 349): '... *Préface ... touchant la Méthode* ...'. Finally, To Unknown, May (end), 1637 (ibid., p. 369): '... discours qui sert de préface ...'.

his defense of Copernicanism, his awareness of the case of Galileo, and his concomitant fear of inquisitorial condemnation.[9] Finally – and here crucially –, the second part of the *Discourse* reports on some of the work on the 'méditations méthodologiques' that would survive in the form of a treatise on method now known as the *Regulæ*, while the fourth part reports on some of the labor on the 'méditations métaphysiques' that would endure in the form of a treatise on metaphysics now celebrated as the *Meditations*.[10]

Therefore the *Discourse* virtually disqualifies itself from being the definitive account of the method of Descartes by pointing straight to another major work as the methodological treatise on which he had been working in 1619 and in the following years.[11] And this magnum opus can be none other than the *Rules for the Direction of the Natural Intelligence*. Still, this is not yet to say anything about the substantial overlapping and underlapping between the rules of the *Discourse* and those of the *Regulæ*.

For philosophical purposes, then, the present edition is very easy to justify: If one wants to understand Descartes, then one must understand the early Descartes; if one wants to understand the early Descartes, then one must understand the *Regulæ*; and, if one wants to understand the *Regulæ*, then one must understand a philosophical edition thereof.

History: The 'Regulæ' in Descartes' Early Years (1618–1629)

Now, although the devil dwells in the details, the early intellectual development – that is, from 1618 to 1629 – of Descartes (1596–1650) may be divided, proceeding carefully from, inter alia, the autobiographical remarks in the *Discourse on the Method*, into three definite phases.[12] For, while this account is admittedly sketchy, it is also remarkably accurate.[13]

[9] Cf., e.g., the reference in *DM*, part V, § 2, to 'a treatise that certain considerations prevented [Descartes] from publishing' (AT, VI, 41), as well as VI, § 1, passim (AT, VI, 60 ff.). Some key letters of Descartes on the case of the Inquisition vs. Galileo are: To Mersenne, Nov. (end), 1633 (AT, I, 270–272), Feb. (ibid., pp. 281–282), Apr. (ibid., pp. 285–288), and Aug. 14, 1634 (ibid., pp. 303–306).

[10] Here I wish to correct an error on p. 119 of my edition of the *Discourse*. For there I relate the reference to the 'méditations ... métaphysiques' (AT, VI, 31) at the beginning of part IV of the *Discourse* directly back to the reflections on logic, on mathematics, and on method on which Descartes reports both in all of part II and at the end of part III – and which were performed in 1619 and in the following years. But, as I myself later point out more than once (p. 128, fn. 83, and p. 164, fn. 305), the 'metaphysical meditations' of part IV of the *Discourse* date, not from 1619, but from 1629. This point is plainly relevant to the retrieval of the place of the *Regulæ* in Descartes' development as sketched in the autobiographical remarks of the *Discourse*. Of which see more below.

[11] In fact, by publication time Descartes thought of himself as having worked for 'twenty years' on the methodological issues of the *Discourse* and of the *Essays*. Cf. *DM*, VI, § 10 (AT, VI, 76), and Letter to Mersenne, Jun. 29, 1638 (AT, II, 191–192).

[12] Of course, this does not include his college and university education at La Flèche and at Poitiers, respectively, a highly selective account of which is given in the first part of the *Discourse*.

[13] Stephen Gaukroger says that 'the *Discours* is not especially reliable as an account of the precise details of Descartes' development'. See *Descartes: An Intellectual Biography* (Oxford, 1995), p. 106. That may be, but the numerous statements about dates – e.g., in part II, §§ 1 and 13, III, 6–7, IV, 1 ff., and VI, 1 and 8, etc. – do check out. In other words, the problem is not reliability, but generality.

The first stage, which begins in the autumn of 1618 with a kind of personal renaissance inspired at least in part by Isaac Beeckman[14] in Holland and which ends in the autumn of 1619 with the meditations of the stove-heated room in Germany,[15] reaches its climax with Descartes' resolution to dedicate his life to scientific research and with his accompanying conception of a *mathesis universalis*, that is, a universal 'mathematics' or 'learning' arising from the extension of certain basic features of mathematical methodology to as many disciplines as possible.[16] For at the beginning of the second part[17] of the *Discourse* Descartes says that '[he] was then in Germany',[18] where, after having attended the coronation of Ferdinand II as Emperor of the Holy Roman Empire of the German Nation in Frankfurt am Main in the late summer of 1619,[19] he was detained by the beginning of the winter of 1619–1620 in quarters most probably located near a place already renowned as a center of mathematical learning, namely, the imperial city of Ulm on the Danube River,[20] and at the end of that part[21] he says that '[he] was then twenty-three [years old]'.[22]

The second stage, a long period of conversation, observation, and reflection which begins shortly after the winter of 1619–1620[23] and which ends in the autumn of 1628 with a resolute rejection of the social distractions of Paris in favor of the hidden life in Holland,[24] is especially characterized by Descartes' cultivation of the new method as well as by his application of it to mathematical and physical problems. For toward the end of the third part[25] of the *Discourse* Descartes thus describes some of his more significant intellectual activities 'in all the nine years following'[26] the reflections in the stove-heated room in Germany at the turn of the year from 1619 to 1620: 'And ... I continued to train myself in the method that I had prescribed to myself. For, besides taking care generally to conduct all my thoughts according to its rules, I reserved for myself from time to time some hours that I spent particularly in practicing it in problems of mathematics, or even in some other problems, too, which I was able to render, as it were, similar to those of mathematics by detaching them from all the principles of the other sciences ... .'[27] This narrative is also internally confirmed by the fact that at the very end of the same part[28] the reference to 'these [same] nine years' is repeated.[29]

[14] Of whom see more below. [15] On Descartes' celebrated 'poêle' see *Discourse*, AT, VI, 11 and 28.
[16] See ibid., pp. 17–22 (*Discourse*, pt. II, §§ 6–13).
[17] See the opening lines of § 1. [18] See AT, VI, 11.
[19] See ibid. The coronation in question is, more precisely, that of Ferdinand, King of Bohemia from June 29, 1617, to August 22, 1619, as Emperor Ferdinand II on August 28, 1619. The official festivities of the occasion lasted from July 20 to September 9, 1619.
[20] He would serve the Catholic Duke Maximilian I of Bavaria (1573–1651), an imperial ally.
[21] See the closing lines of § 13. [22] See AT, VI, 22.
[23] See ibid., p. 28: '... the winter had not been over for very long when ...'.
[24] Of course, there are many things about the itinerary of the early Descartes that we shall probably never know with certainty. E.g., when *exactly* did Descartes *finally* relocate from France to Holland – in late 1628 or in early 1629? One can only begin by seeing the Letter to Mersenne, Oct. 8, 1629 (AT, I, 24), and the following correspondence.
[25] See § 6, passim. [26] See AT, VI, 28. [27] See ibid., p. 29.
[28] See the opening lines of § 7.
[29] See AT, VI, 30. There is also independent contemporaneous corroboration of many of the details of Descartes' development as he sets them down in the *Discourse*. E.g., Beeckman also records that, when Descartes visited him in Dordrecht on October 8, 1628, he informed him that he was 'done

According to this temporal sequence, therefore, 'these ... years' are from 1619 to 1628.[30]

The third stage, a short period which begins with a turn away from specifically methodological issues sometime during the later part of 1628[31] and which ends with constantly shifting focuses of interest sometime during the latter part of 1629,[32] is devoted almost entirely to Descartes' attempt to formulate the foundations of his 'classic' metaphysics in a little treatise, now lost, on the existence of God and on the immortality of the human soul – twin labyrinthine threads running from the 'Treatise on Metaphysics' via the *Discourse on the Method* to the *Meditations on First Philosophy*.[33] For at the beginning of the fourth part[34] of the *Discourse* Descartes wonders whether he should report to the reader on 'the first meditations that [he] did there [in Holland]'[35] – because he is afraid that these reflections are 'so metaphysical and so uncommon that perhaps they will not be to the taste of everyone',[36] while it is now known from other sources that

with arithmetic and with geometry' because in these disciplines he had grasped as much as possible for the human mind – 'in the last nine years' or from 1619 to 1628 ('his novem annis') (AT, X, 331).

[30] As far as one can tell, Descartes was writing the final draft of the *Discourse* from the fall of 1635 to the spring of 1636, and he could have reckoned that it was going to be published in the (late) spring of 1637. Cf. *DM*, VI, §§ 1 and 8 (AT, VI, 60 and 74), Letter to Huygens, Nov. 1, 1635, and To Mersenne, Mar., 1636. Thus, too, his claim that 'it is exactly eight years ago' that he retired to Holland – also in *DM*, III, § 7 (AT, VI, 31) –, i.e., in the winter of 1628–1629, is verifiable.

[31] Cf. once again the phenomenon of 'aversion' that Beeckman registers in his remarks on Descartes' intellectual development in the fall of 1628 (AT, X, 331): 'Is [Descartes] dicebat mihi se in arithmeticis et geometricis nihil amplius optare: id est, se tantum in iis ... profecisse, quantum humanum ingenium capere possit.'

[32] See Letter to Mersenne, Apr. 15, 1630 (AT, I, 137–138): 'And, if you find it strange that I have not continued some other treatises that I began while I was in Paris, I will tell you the reason for this. It is that, while I was working on them, I acquired a little more knowledge than I had had when I began them, and, when I tried to accommodate this, I was forced to start a new project [un nouveau projet], a little larger than the first. Thus it is as if someone had begun to build a house and then acquired unexpected riches and so changed his status that the building that he had begun was now too small for him. One would not blame him if one saw him starting to build another house more fitting to his fortune.'

[33] Cf. Letter to Mersenne, Nov. 25, 1630 (AT, I, 182): '... perhaps I may someday complete a little Treatise on Metaphysics [un petit Traité de Métaphysique], which I began when I was in Friesland [Holland], in which I set out principally to prove *the existence of God and of our souls* when they are separate from the body, from which their immortality follows.' Of which see more below.

[34] See the opening lines of § 1. [35] See AT, VI, 31.

[36] Once again, since the beginning of the fourth part of the *Discourse* picks up immediately on the end, not of the second part, but rather of the third, the reflections back to which Descartes is directly referring here are surely not those started in Germany in 1619, but rather those performed in Holland in 1629. The decisive passage for distinguishing between the two sets of reflections is found toward the beginning of *DM*, III, § 6. For there Descartes explicitly mentions 'the stove-heated room where [he] had had all these thoughts' (AT, VI, 28), adding that 'the winter had not been over for very long when [he] set out to travel' (ibid.). Here 'all these thoughts' could only be those that he had had in 'the stove-heated room' in 'the winter' of 1619–1620 in Germany. On the other hand, 'the first meditations' on which the fourth part focuses are a different case of cogitations altogether, namely, those which Descartes thought through in Holland in 1629. In any case, since the last sentence of part three describes Descartes' emigration to Holland, the 'there' ('y') of the first sentence of part four must refer to this country – where he went to live at the end of 1628 or at the beginning of 1629 –, not to France and not at all to Germany.

the full fate of his 'little treatise on metaphysics' is virtually undecidable.[37] What is established, however, is that 'during the first nine months in which [he] was in [Holland Descartes] did not work on anything else' but on the Latin treatise that was intended to contain his 'metaphysical meditations'.[38]

Thus the chronological clues provided by the *Discourse on the Method* enable the *Regulæ* to emerge as the key text of the early Descartes. For there happens to be a coincidence between the fact that there is a block of time in his intellectual development between the end of 1619 and the end of 1628, on the one hand, and the fact that he appears to have begun the work on the rules of the method in Germany from 1619 to 1620 and to have continued it in France – and perhaps in Holland – from 1626 to 1628, on the other hand.[39] Of course, for reasons that are not entirely evident, Descartes never did complete the task. For the work breaks off toward the end of the second part, and only twenty-one of the projected thirty-six rules are given – apparently, there were to have been three parts consisting of twelve rules each.[40] It is a classic case of parts in search of a whole.

Still, one should not make haste past the question of the dating of the *Regulæ*. For there have been two rather contrary patterns of thought on this issue, namely, the older, more straightforward way, and a newer, more discriminating approach. On the one hand, for example, Millet – grasping the text as basically a unit – has proposed that the winter of 1628–1629, thus when Descartes was leaving France to settle in the Netherlands, was the time at which the *Regulæ* were first drafted.[41] On the other hand, for example, Weber – apprehending the text as fundamentally a fragment – has argued that Descartes was almost continuously, but, of course, intermittently, composing the *Regulæ* from October, 1619, to October, 1628, with at least some work being done virtually every year.[42] Now the scholarly consensus appears to be that, while Millet's position is falsifiable in general, Weber's account is not verifiable in all its particulars.[43]

[37] On 'the little treatise on metaphysics' see Letter to Gibieuf, Jul. 18, 1629 (AT, I, 17), and Letters to Mersenne, Dec. 18, 1629 (ibid., pp. 83–95), Apr. 15 and Nov. 25, 1630 (ibid., pp. 135–147 and 178–182), and Feb. 27, 1637 (ibid., pp. 348–351).

[38] See, first, Letter to Gibieuf, Jul. 18, 1629 (AT, I, 17): '... a little treatise that I am starting ...'. And, To Mersenne, Dec. 18, 1629 (ibid., p. 85): '... the little treatise that I have in hand ...'. Then, To Mersenne, Apr. 15, 1630 (ibid., p. 144): 'Les neuf premiers mois [i.e., months at the beginning of 1629 and maybe even already at the end of 1628] que j'ai été en ce pays [Holland], je n'ai travaillé à autre chose ... .' Next, To Mersenne, Nov. 25, 1630 (ibid., p. 182): '... a little Treatise on Metaphysics, which I began when I was in Friesland ...'. Finally, To Mersenne, Feb. 27, 1637 (ibid., p. 350): 'About eight years [environ huit ans] ago ... I wrote in Latin [en latin] the beginnings of a treatise on metaphysics [un commencement de métaphysique] ... .'

[39] In the Interpretive Essay to the bilingual edition I specify 'from 1619–1620 to 1628–1629' (pp. 122 and 127) as 'the nine years' mentioned in the *Discourse* (III, §§ 6–7). The reason is that I am counting from the one turn of the year to the other, there being nine years starting at the turn of 1619 into 1620 and stopping at the turn of 1628 into 1629. Either one can understand Descartes also to be counting in this way or one must suppose that a mathematician of his caliber does not know how to count even to ten – or that his memory is selective or faulty.

[40] See Adrien Baillet, *La Vie de Monsieur Des-Cartes* (Paris, 1691), vol. II, pp. 404–406, and Baillet, *Vie de Monsieur Descartes* (Abridgment) (Paris, 1692/1946), pp. 262–263.

[41] Cf. Joseph Millet, *Descartes – Sa vie, ses travaux, ses découvertes avant 1637* (Paris, 1867), pp. 154–162.

[42] Cf. Jean-Paul Weber, *La constitution du texte des 'Regulæ'* (Paris, 1964), passim, especially pp. 195–206. In addition, the essentials of the same account are not only available, but also much more accessible, in: Jean-Paul Weber, 'Sur la composition de la Regula IV de Descartes', *Revue philosophique de la France et de l'étranger*, vol. 154 (1964), pp. 1–20.

But cannot the *Discourse* also be interpreted in such a way as to help to determine more accurately the date of the *Regulæ*? For, in addition to the circumstantial evidence concerning the timing of the *Regulæ* that has already been presented, the *Discourse* contains what may be apprehended as an oblique reference to the main work that would have been in progress in the previous decade. At one point, namely, Descartes writes:[44]

> These nine years passed by, however, before I had yet taken any side concerning the difficulties that are customarily disputed among the learned or had begun to seek the foundations of any philosophy more certain than the vulgar. *And the example of many excellent minds, who, having had the plan before this, seemed to me not to have succeeded in it, caused me to imagine such difficulty in it that I would perhaps not have dared to undertake it so soon again, if I had not seen that some had already spread the rumor that I had achieved the goal of it. I cannot say on what they based this their opinion; and, if I have contributed something to it by my conversations, this must have been by confessing that of which I was ignorant more ingenuously than those who have studied a little are accustomed to do, and perhaps also by showing the reasons that I had for doubting many of those things which the others held to be certain, rather than by my boasting of any learning.* But, having a heart sincere enough not at all to want anyone to take me for other than I was, I thought that it was necessary that I were to try, by all means, to render myself worthy of the reputation that one had bestowed on me ... .

Once again, the 'nine years' mentioned are from 1619 to 1628. Now, on the assumption – which this passage intimates – that Descartes did indeed say something to his fellow researchers that may have prompted them to start or to fuel 'the rumor' that he had achieved the goal of finding the foundations of a philosophy more certain than the vulgar, the question is, which of his 'conversations' might have contributed to this state of affairs?

One plausible answer is Descartes' active, substantive participation in the 'Chandoux Conference' of 1627.[45] The meeting was sponsored by, and took place at the Paris residence of, Guidi di Bagno (ca. 1565–1641), the French papal nuncio and later Cardinal who, though not himself a libertine, then entertained close ties to libertine circles.[46] The featured speaker was a certain Sieur de Chandoux, a French (al)chemist who professed medicine (he also happened to be a forger who in 1631 would be

[43] See Gaukroger, *Descartes: An Intellectual Biography*, p. 111: 'Although the *Regulæ ad directionem ingenii* ... were once generally thought to have been composed in 1628, there have always been those who have believed that at least some of them were composed earlier, and ... there is now good reason to suppose that the *Regulæ* were in fact composed between 1619–20 and 1626–8, and that a number of stages of composition are evident, some of the Rules comprising material composed at very different times.'

[44] See *Discourse*, pt. III, § 7 (AT, VI, 30–31) – emphasis added.

[45] See Baillet, *La Vie de Monsieur Des-Cartes*, bk. II, ch. XIV, pp. 160–166, and *Vie de Monsieur Descartes*, pp. 69–74. Baillet places the conference in the fall of 1628. On the other hand, Geneviève Rodis-Lewis holds the earlier date to be correct. See *L'œuvre de Descartes* (Paris, 1971), vol. 2, pp. 478–479, and cf. *Textes et débats: Descartes* (Paris, 1984), p. 63–64. Although Gaukroger agrees with Baillet, he points out that nothing depends on the year at issue (see *Descartes: An Intellectual Biography*, p. 183). For my purposes, too, this is acceptable, since it does not much matter whether it was in 1627 or in 1628 that Descartes was externally pushed to work on his rules. Indeed, the later date might even strengthen the case that at the Chandoux Conference Descartes was intimating rules of the *Regulæ*. On the other hand, I do not want to be opportunistic about it.

[46] Even a decade later Descartes would be sure to see to it that Bagni receive copies of the *Discourse on the Method*. See Letters to Mersenne, Dec., 1638, and Jun. 19, 1639 (AT, II, 464 and 565).

executed for counterfeiting).[47] Also present were, on the one hand, some of Descartes' closest associates, including Marin Mersenne (1588–1648), the Franciscan scholar with mechanistic tendencies who had been his fellow collegian at La Flèche and who would later become his 'literary agent',[48] and Étienne de Villebressieu (d. 1653), the French chemist, natural philosopher, and royal engineer with whom Descartes would share quarters,[49] as well as, on the other hand, others, including Pierre de Bérulle (1575–1629), the French Cardinal (from 1627 on) and founder of the Oratory who would soon encourage Descartes to pursue a philanthropic philosophy by means of the application of his method to such areas as medicine and mechanics.[50]

Now the featured nobleman's presentation, 'un grand discours' refuting the manner in which philosophy was ordinarily taught and learned in the schools but failing to elucidate the allegedly 'novel system' of his own, was generally ardently acclaimed by those present.[51] That is, except for Descartes, who – in 'a discourse on the method' of his own – accepted Chandoux's rejection of the reigning Scholastic mixture of Aristotelianism and Thomism, while demurring about the rest.[52] The gist of his sentiments appears to have been that knowledge would have to be based on certainty and not on probability – as Descartes took Chandoux to be suggesting –, as well as that without the proper method it would hardly be possible to distinguish between the probable and the certain.[53] The 'benefits' of Descartes' procedure were its capacity, first, to show whether a problem be soluble, and then, if so, to indicate how an infallible solution would look.[54] Thus did Descartes propose – but only after being pressed to do so by others – 'his own principles' or 'universal rule' or 'natural method' as an 'infallible means of avoiding plausible but fallacious inferences'.[55]

To be sure, all that is known about the material issues at stake here is that 'the rule' was modeled after 'the rules of mathematics' and that 'the method' was 'derived from the foundations of mathematics',[56] a discipline in which – 'above all others' – Descartes had, already during his college education, 'delighted … because of the certitude and the evidence of its reasonings' as well as because of its 'firm and solid foundations'.[57] For the idea was to begin with propositions that were so simple and so evident as to be indubitable, in order to progress from them to more and most complex propositions in such a way that no inferential step were not similarly beyond doubt.[58] None the less, it is also known that Descartes felt that from the Chandoux Conference he had received

[47] Cf. AT, XII, 95–98.

[48] Of whom see more below.

[49] Cf., e.g., Letter to Villebressieu, Summer, 1631 (AT, I, 215).

[50] Cf. Baillet, *Vie de Monsieur Descartes*, pp. 72–74.

[51] Cf. ibid., p. 70. [52] Cf. ibid., pp. 70–71. [53] Cf. ibid., pp. 71–72.

[54] See ibid., p. 72: 'Ce moyen … il mettait à l'épreuve toutes sortes de propositions. Le premier fruit de cette méthode était de faire voir d'abord si la proposition était possible ou non. L'autre fruit consistait à lui faire résoudre infailliblement la difficulté de la même proposition.'

[55] Cf. ibid.: '… ses propres principes … sa règle universelle … sa *Méthode naturelle* …'.

[56] Cf. Baillet, *La Vie de Monsieur Des-Cartes*, bk. II, ch. XIV, pp. 160–166 (and context): '… [les] mathématiques … les règles de l'arithmétique …'. Cf. also Baillet, *Vie de Monsieur Descartes*, p. 72: '… ajoutant qu'il l'[the means of avoiding sophisms]avait tiré du fonds des mathématiques …'.

[57] See *Discourse*, pt. I, § 10 (AT, VI, 7–8).

[58] Cf. Baillet, *Vie de Monsieur Descartes*, pp. 70–72, and Descartes, *Regulæ*, Rs. 5–6 (AT, X, 379–387), and *Discourse*, pt. II, §§ 9 and 11–13 (AT, VI, 19–22).

an exhortation 'to publish and to teach [his] principles', which he in any case judged to be 'better established, more veridical, and more natural' than any others.[59] For, even if he had not yet begun to write his first major work on method before the conference – which is highly unlikely –, much of it still must have been present in his mind beforehand, and after the conference he appears indeed to have been preoccupied with formulating the rules of it.[60]

Now the exposition of the method of the *Regulæ* is oriented on – but not to be identified with – the effort at an extension of geometrical algebra into a *mathesis universalis*. For the main aim is the attempt at a realization of the ideal of a universal mathematics capable of dealing specifically with all those aspects of its objects which can be ordered and measured independently of any particular material features; thus the first and foremost objects of this discipline turn out to be relations and proportions, not only between numbers, figures, et cetera, but also between stars, sounds, et cetera.[61] Therefore the account of the method given at the Chandoux Conference, which is essentially and fundamentally mathematical, may have provided the impetus for Descartes to formulate the de facto final version of the *Regulæ* with its central conception of a *mathesis universalis*.[62] Unfortunately, however, beyond the vaguely 'mathematical' character of the method set forth at the conference, there is little extant information on its content.[63] For example, both during and after the conference Descartes appears to

[59] See Letter to Villebressieu, Summer, 1631 (AT, I, 213): 'You have seen these two results [ces deux fruits] of my fine rule [ma belle règle] or of my natural method [Méthode naturelle] in the discussion [l'entretien] that was forced on me in the presence of the Papal Nuncio, of Cardinal de Bérulle, of Father Mersenne, and of all that great and learned company which was assembled at the Nuncio's residence to hear M. de Chandoux's discourse concerning his new philosophy [le discours … touchant sa nouvelle philosophie]. It was there that I made the whole company recognize what the art of reasoning well [l'art de bien raisonner] can do for the minds [l'esprit] of those who are of mediocre learning [ceux qui sont médiocrement savants], and how my principles [mes principes] are better established [mieux établis], more veridical [plus véritables], and more natural [plus naturels] than any of those others which are currently accepted among the men of learning [les gens d'étude]. You were as convinced as all the others, and you were all good enough to beg me to put my principles in writing and to teach them to the public [de les écrire et de les enseigner au public] … .'

[60] In his *Vitae Cartesii compendium* (Paris, 1653) Pierre Borel (of whom see more below) reports that, after Descartes had been urged at the Chandoux Conference to publish his principles – according to which he claimed to be able to demonstrate the truth in a mathematical manner in all matters –, he promised to do so and went to Holland for this purpose (p. 4): 'Exoratus tunc fuit, ut illa [sua principia] publici juris faceret; quod illis concedere coactus, in Hollandiam sese contulit ut ea melius digesta ederet.'

[61] Cf. *Regulæ*, Rs. 4 and 8 (AT, X, 375–379 and 394), and *Discourse*, pt. II, § 11 (AT, VI, 19–20: '… les divers rapports ou proportions … ces proportions en général …').

[62] In his journal Beeckman also reports on the encounter in Dordrecht of October 8, 1628, that Descartes provided him with 'clear samples' ('non obscura … specimina') of his mathematical results as well as that he promised to send to him 'his algebra, which he says is finished' ('… suam algebram, quam perfectam dicit …') – an algebra 'by means of which one arrives at a perfect science of geometry and with which one can even arrive at all human knowledge' ('… quaque ad perfectam geometriae scientiam pervenit, imo qua ad omnem cognitionem humanam pervenire potest …') (AT, X, 331–332). The specimens given (ibid., p. 333 ff.) are related to matters discussed in Rs. 14 and 15, while the hint at *mathesis universalis* – involving the extension of geometry, via the application of algebra, into a universal mathematical discipline – is obvious.

[63] But see Heinrich Springmeyer, Lüder Gäbe, and Hans Günter Zekl (eds.), *Regulæ ad directionem ingenii / Regeln zur Ausrichtung der Erkenntniskraft* (Hamburg, 1973), p. XXVI, where Gäbe may be

have spoken in the singular of '[his] fine rule'.[64] But can any one of the rules of the *Regulæ* be certainly identified as the 'fine, universal rule' of the conference?[65]

After all, no single rule of the *Regulæ* is acknowledged in any such manner. On the contrary, if one peruses even the first half-dozen rules of the *Regulæ*, then one

going somewhat beyond the evidence when he claims that at the Chandoux Conference Descartes talked 'concretely' about the *Regulæ*: 'Descartes hat in dem betreffenden Gespräch nicht nur allgemein über seine Methode, sondern konkret über die *Regulæ ad directionem ingenii* geredet, und man hat ihn gebeten, *dieses Buch* fertig zu schreiben und herauszugeben.'

[64] See, once again, Baillet, *Vie de Monsieur Descartes*, p. 72, and Descartes, Letter to Villebressieu, Summer, 1631 (AT, I, 213). Inferring from the fact that at the Chandoux Conference Descartes offered – 'by means of twelve probable arguments' – to prove false any supposed truth or to prove true any supposed falsehood (cf. both Borel, *Vitae Cartesii compendium*, p. 4 ['duodecim argumentis verisimilibus'], and Baillet, op. cit., p. 71 ['avec douze arguments tous plus vraissemblables l'un que l'autre']), Gäbe finds (*Regulæ / Regeln*, pp. XXV–XXVI) an immediate connection between his remarks there and the *Regulæ*, the number '12' being the key to the structure of this work. While there might be something to this, Descartes' usage of the number may also be just echoing the appeal to the classical tropes of skepticism, which were usually listed in groups of ten, five, and two. Cf. Julia Annas and Jonathan Barnes, *The Modes of Scepticism: Ancient Texts and Modern Interpretations* (Cambridge, 1985), passim, as well as Sextus Empiricus, *Outlines of Scepticism* (Cambridge, 1994), trans. Julia Annas and Jonathan Barnes, esp. bk. I, chs. XIV–XVI. Of course, this is not at all to imply that on this occasion Descartes was advocating skepticism. On the contrary, he may have only been playing the devil's advocate by trying to make clear to those assembled how precarious their epistemological situation would be if they remained content with probability and did not strive for certainty. It almost goes without saying that the skeptical tropes were available to Descartes both through contemporary editions of Sextus' *Pyrrhoneion hypotypposis* (e.g., Paris, 1562 [Latin], and Cologne/Paris/Geneva, 1621 [Greek]) and through the omnipresent editions of Montaigne's *Essays* – of which see more below –, esp. 'An Apology for Raymond Sebond' (cf. *Essays*, bk. II, ch. 12), where these tropes constitute the structure of much of the argument.

[65] According to Gaukroger, '[t]he only thing to be found in any extant writing of Descartes' from this period [i.e., that of the Chandoux Conference and of the later *Regulæ*] that could be described as "true and natural principles" is his doctrine of clear and distinct ideas' (*Descartes: An Intellectual Biography*, pp. 183–184). But, aside from the fact that it is questionable whether there is a 'doctrine of clear and distinct ideas' in the *Regulæ* (of which see more below), Gaukroger's interpretation involves a tenuous revision of the traditional approach to the development of Descartes' attitude toward skepticism (ibid., p. 184): 'But I can find nothing in the *Discours* or the correspondence from this period to indicate any interest in scepticism on Descartes' part at this time [i.e., ca. 1628–1629], nor can I find any evidence at all that Descartes was motivated by an interest in scepticism before the 1630s.' Here Gaukroger is criticizing Richard H. Popkin's account of Descartes' reaction to the Chandoux Conference – cf. *The History of Scepticism from Erasmus to Spinoza* (Berkeley, 1979), pp. 174–175 –, which account emphasizes the connection between the reaction and the reference, e.g., to 'toutes les plus extravagantes suppositions des sceptiques' at the beginning of Part Four of the *Discourse* (AT, VI, 32). Thus, too, Gaukroger adds: '... sceptical questions are absent from the discussions of cognition in the *Regulæ* ...' (op. cit., p. 319). Yet such a categorical statement does not fit well with passages such as R. 12, § 17, on what some might apprehend as Descartes' interpretation of Socratic skepticism. Moreover, Gaukroger appears to overlook the fact that the entire fourth part of the *Discourse*, which does indeed have the refutation of skepticism as one of its central concerns, is essentially a report on meditations performed some years previously, i.e., certainly in early 1629, possibly in late 1628, and probably – partially – both in late 1628 and in early 1629. To be sure, this does not mean that this account of Descartes' development is accurate merely because it is his own. None the less, the narratively retrospective character of Part Four of the *Discourse* does constitute vivid evidence against the understanding according to which Descartes was not at all concerned with skepticism before 1630 or according to which there were no evidence of his having been thus concerned. This holds a fortiori when one considers the arguably 'anti-tropical' aspects of the challenge issued by Descartes to his colleagues at the Chandoux Conference.

recognizes that each and every one of them has something special about it that would allow Descartes to describe it as uniquely 'established, veridical, and natural'. For example, Rule 1, concerning the formation of solid and true judgments as the direction in which the natural intelligence has to move, is 'not without merit' selected as the first of all.[66] Rule 2, concerning the role of certainty and that of probability in the search for knowledge, displays a remarkable resemblance to what is preserved of the discussion at the Chandoux Conference.[67] Rule 3, concerning evident intuition and certain deduction as the only modes of inference in the acquisition of knowledge, contains an initial intimation of evidence as the key to knowledge.[68] Rule 4, concerning the necessity of method for the investigation of the truth of things, defines method in terms of rules and thus may be characterized as that rule which prescribes that the strictest rule of all is that rules are indispensable in the search for the truth.[69] Rule 5, concerning both (1) analysis or resolution or regression from complicated and obscure propositions to simple and clear ones and (2) synthesis or composition or progression from simple and clear propositions to complex and clear ones, begins with the statement that '*the whole method consists in* the order and arrangement of the things on which the vision of the mind has to be focused'.[70] Rule 6, concerning the distinction between the simplest things and the complicated ones and the identification of the former, asserts that 'there is no more useful proposition in this entire treatise'.[71] Among the rules of the *Regulæ*, then, one enjoys considerable latitude in choosing one that could qualify as Descartes' 'first and foremost' rule of the time.

Yet a sensible alternative might be to take the hint when Descartes speaks of '[his] fine rule *or* natural method'.[72] Indeed, although in the context of the Chandoux Conference Descartes does talk about '[his] principes' in the plural,[73] he does not speak of 'règles' in the same number. Thus, while there are multiple 'principles', there is but one 'rule' or 'method', which would, then, be unique.[74] Now, whatever rule or method is at stake here, the rule seems to be in some sense a method and the method seems to be in some sense a rule. In fact, when Descartes uses the term 'règle' in this context, he may also have in mind one of the perfectly legitimate Latinate senses of the time, namely, 'rule' as a – method(olog)ical – 'measure' or 'standard'.[75] In a word, he may very well mean 'règle' in the sense of 'criterion' – as in 'criterion of truth', thereby making it reasonable to assume that such a rule or method would have had something,

[66] See AT, X, 360: 'Ac proinde non immerito hanc regulam primam omnium proponimus ... .'

[67] See ibid., pp. 362–366, passim.

[68] See ibid., p. 366: '... evidenter ...'.

[69] See ibid., pp. 371–372 (§ 1).

[70] See ibid., p. 379 (emphasis added): '*Tota methodus consistit in* ... .'

[71] See ibid., p. 381: '... nec ulla [propositio] utilior est in toto hoc tractatu ...'.

[72] See, once again, Letter to Villebressieu, Summer, 1631 (AT, I, 213): '... ma belle règle *ou* Méthode naturelle ...' (emphasis added).

[73] See ibid.: '... mes principes ...' (emphasis added).

[74] Cf., once again, Baillet, *Vie de Monsieur Descartes*, p. 72: '... ce moyen suivant ses propres principes. Ce moyen n'était autre que sa règle universelle *qu'il appelait autrement* [this emphasis added] sa *Méthode naturelle* ... .' This statement is especially remarkable.

[75] Cf. Karl Ernst Georges, *Ausführliches Lateinisch-Deutsches Handwörterbuch* (Darmstadt, 1992), vol. 2, col. 2285.

however indeterminable now, to do with *evidence* as the criterion of knowledge.[76] For the French 'règle' is derived from the Latin 'regula' and both have a common ancestor in the Indo-European root 'reg-'.[77] Accordingly, a rule (originally: a rod) is what guides or leads someone in the 'direction' (another common descendant of the same root)[78] of a goal – which is precisely what a method does.[79] To proceed according to a method is to follow some rules. Both philosophical investigation in general and scientific research in particular are rule-governed – but not rule-determined – activities.[80] Then the emphasis is neither on the rules that compose the method nor on the method that comprises the rules, but rather on a method as the rule, that is, as the measure, of philosophical and scientific progress. The point is that, when Descartes speaks of 'his … rule' here, he need not be intending any one of the rules of the *Regulæ* in particular, but rather could he be referring to the rules of the method in general – and especially to those which are directly related to evidence[81] – as 'my fine measure or natural standard'. In any case, this interpretation is consistent with the reflexive definition, in the *Regulæ*, both of 'method' in terms of rules and of 'rules' in terms of method (*pars pro toto et totum pro parte*).[82]

In conclusion, the Chandoux Conference is surely one of the most important events of Descartes' life that can be directly connected to the writing of the *Regulæ*. But the truth of the matter, in so far as it is at all attainable, may lie in the mean between the extremes of underdetermination and overdetermination. For, mainly and mostly due to the fact that comparatively little of Descartes' correspondence from the decade 1620–1630 has survived, scholars may just have to deal with the situation that some aspects of the question about the exact timing of the composition of the *Regulæ* are undecidable. Moreover, the sedimented origins of the affair render it far harder to identify the *terminus a quo* than the *terminus ad quem*. In any case, there is enough evidence that Descartes was finishing his work on the *Regulæ* at about the same time at which he was shifting his permanent residence from France to Holland.[83] Therefore, if

[76] Cf., e.g., Letter to Mersenne, Oct. 16, 1639 (AT, II, 597–598), where Descartes says that he has no 'criterion of truth' other than the natural light of reason: '… pour moi, je n'ai point de règle que la lumière naturelle …'.

[77] Cf., e.g., 'Appendix of Indo-European Roots', *The American Heritage Dictionary of the English Language, Third Edition* (Boston/New York/London, 1992), pp. 2121–2122.

[78] Cf. ibid., p. 527.

[79] Cf. ibid., p. 1135. The English 'method', the German 'Methode', and the French 'méthode' all derive from the Latin 'methodus' and from the Greek 'methodos' ('pursuit' = 'meta' [along, with, after] + 'hodos' [path, way, journey]). Thus the original meaning of the term is still alive, a method being 'a means or manner of procedure, especially a *regular* and systematic way of accomplishing something' (emphasis added).

[80] For a fine survey of the origin and of the development of the idea of 'method' in the history of Western philosophy see the series of articles by Joachim Ritter et al., 'Methode' (etc.), *Historisches Wörterbuch der Philosophie*, ed. J. Ritter and K. Gründer, vol. 5 (Darmstadt, 1980), cols. 1304–1386.

[81] Cf., e.g., Rs. 2 and 3.

[82] Cf. R. 4, § 1 (AT, X, 371–372).

[83] With respect to 'the vexed question of whether Descartes spent the winter of 1628/9 in France or in the Netherlands', Gaukroger is first 'inclined to accept the argument … that he spent the time in the Netherlands' (*Descartes: An Intellectual Biography*, p. 443). But then, only a few lines later on the same page, he asserts that 'Descartes had spent the winter of 1628/9 in the countryside of Brittany' (ibid.). The fact that such a superb account still contains such an egregious inconsistency serves to highlight the degree of difficulty involved. Still, I do concur with Gaukroger's statement in the main text that 'although Descartes had been in the Netherlands in October [of 1628], he probably returned to Paris in November, not actually moving permanently until the beginning of 1629' (see ibid., p. 183, and cf. ibid., p. 187).

'the date of the *Regulæ*' is strictly construed as the time of their final redaction, that is, as the time during which Descartes was bestowing on the text that form in which it has been handed down and in which it is now printed, then this date would most probably be the autumn of 1628.[84]

Prolegomena: The 'Metaphysical Correspondence' (1630)

To be sure, neither Descartes' early 'Treatise on Metaphysics' as such nor much of his correspondence from the decade 1620–1630 has survived. None the less, there are several crucial letters dating from this period which can provide insight into the nature of the research in which Descartes was engaged immediately after having interrupted the work on the *Regulæ*. For these letters, all to Mersenne, first elaborate what has since become known as 'Descartes' doctrine of eternal truths'.[85] Now there is a strong connection between the 'Treatise on Metaphysics' of 1629 and what may be referred to as the 'Metaphysical Correspondence' of 1630,[86] as well as good reason to think that elements of the former are being revealed in the latter.[87] Indeed, it is in direct connection with his expressed opinion that he has discovered 'how one can demonstrate the metaphysical truths in a fashion that is more evident than the demonstrations of geometry' that Descartes develops his views on 'the eternal truths' in the greatest detail.[88] What, if anything, then, does this correspondence reveal about Descartes' intellectual concerns after his thinking turned away from methodology in 1628 and toward metaphysics in 1629, and how is this relevant for a reading of the *Regulæ*?

[84] See Gäbe, *Regulæ / Regeln*, p. XXII: 'Unter dem *Datum* der *Regulæ* kann demgemäß nur die Zeit ihrer letzten Redaktion verstanden werden, die Zeit also, in der der Text diejenige Form angenommen hat, in der er uns überliefert ist und in der vorliegenden Ausgabe abgedruckt wurde. Dies ist mit der größten Wahrscheinlichkeit der Herbst 1628.'

[85] See Letters to Mersenne, Apr. 15 (AT, I, 135–147), May 6 (ibid., pp. 148–150), and May 27, 1630 (ibid., pp. 151–154). Also relevant to 'the doctrine of eternal truths' are Letter to Mersenne, May 27, 1638 (AT, II, 138), To Mesland, May 2, 1644 (AT, IV, 111–120), *Replies to the Fifth and Sixth Sets of Objections to the 'Meditations'*, and *Principles of Philosophy*, I, §§ 22–24 and 48–49.

[86] Cf., e.g., Letter to Mersenne, Apr. 15, 1630, where Descartes says about 'a metaphysical question [question … métaphysique] which is to be examined by human reason' (AT, I, 144): 'I think that all those to whom God has given the use of this reason have an obligation to employ it principally in the endeavor to know him and to know themselves.' Once again, knowledge of God and knowledge of the self were the twin topics of the 'Treatise on Metaphysics'. Cf. To Mersenne, Nov. 25, 1630 (AT, I, 182).

[87] Cf. Letter to Mersenne, Apr. 15, 1630, where, before focusing on the relationship between 'the mathematical ["eternal"] truths' and God, Descartes refers to his 'metaphysical investigations' (AT, I, 144): 'During my first nine months [i.e., at the beginning of 1629 and perhaps even already at the end of 1628] in this country [Holland] I worked on nothing else.' The clear implication in context is that in the following remarks on 'mathematical truths' Descartes is going to be drawing on his earlier inquiries into 'metaphysical truths'.

[88] See Letter to Mersenne, Apr. 15, 1630 (AT, I, 144): '… comment on peut démontrer les vérités métaphysiques, d'une façon qui est plus évidente que les démonstrations de géométrie …'.

In the first letter Descartes says that 'the mathematical truths' held by human beings to be 'eternal' are, in effect, creatures of God, and that such truths, at least from God's standpoint, are thus not at all 'necessary':[89]

> But … I shall touch on several metaphysical questions, and especially on this one: whether the mathematical truths which you call 'eternal' have been established by God and depend on him entirely, as well as do all the rest of his creatures. In fact, to say that these truths are independent of God is to talk of him as if he were Jupiter or Saturn and to subject him to the Styx and to the Fates. Please do not hesitate to assert and to proclaim everywhere that it is God who has established these laws in nature, just as a king establishes laws in his kingdom. For there is not one of them that we cannot comprehend if our mind turns to consider it, and they are all inborn in our minds, just as a king would imprint his laws on the hearts of all his subjects if he had enough power to do so. On the other hand, we cannot comprehend the grandeur of God, even though we know it. But the very fact that we judge it incomprehensible makes us esteem it more; just as a king has more majesty when he is less familiarly known by his subjects, provided, of course, that they do not think, due to this lack of familiarity, that they are without a king, and that they know him well enough to be in no doubt about this. One will tell you: 'If God had established these truths, then he could change them as a king does his laws.' To this it is necessary to respond: Yes, if his will can change. 'But I comprehend them to be eternal and immutable.' – And I, for my part, judge the same about God. 'But his will is free.' – Yes, but his power is incomprehensible; and, in general, we can well assert that God can do all that which we can comprehend, but not that he cannot do that which we cannot comprehend; for it would be rash to think that our imagination reaches as far as his power.

Here a most important kind of truth is radically contingent in that it is entirely dependent on the free will of God who creates it – with ineluctable implications for all truth. This is essentially a *theological* theory of truth.[90]

[89] See ibid., pp. 145–146: 'Mais je ne laisserai pas de toucher … plusieurs questions métaphysiques, et particulièrement celle-ci: Que les vérités mathématiques, lesquelles vous nommez éternelles, ont été établies de Dieu et en dépendant entièrement, aussi bien que tout le reste des créatures. C'est en effet parler de Dieu comme d'un Jupiter ou Saturne, et l'assujettir au Styx et aux destinées, que de dire que ces vérités sont indépendantes de lui. Ne craignez point, je vous prie, d'assurer et de publier partout, que c'est Dieu qui a établi ces lois en la nature, ainsi qu'un roi établit des lois en son royaume. Or il n'y en a aucune en particulier que nous ne puissions comprendre si notre esprit se porte à la considérer, et elles sont toutes *mentibus nostris ingenitae*, ainsi qu'un roi imprimerait ses lois dans le coeur de tous ses sujets, s'il en avait aussi bien le pouvoir. Au contraire nous ne pouvons comprendre la grandeur de Dieu, encore que nous la connaissions. Mais cela même que nous la jugeons incompréhensible nous la fait estimer davantage; ainsi qu'un roi a plus de majesté lorsqu'il est moins familièrement connu de ses sujets, pourvu toutefois qu'ils ne pensent pas pour cela être sans roi, et qu'ils le connaissent assez pour n'en point douter. On vous dira que si Dieu avait établi ces vérités, il les pourrait changer comme un roi fait ses lois; à quoi il faut répondre que oui, si sa volonté peut changer. – Mais je les comprends comme éternelles et immuables. – Et moi je juge le même de Dieu. – Mais sa volonté est libre. – Oui, mais sa puissance est incompréhensible; et généralement nous pouvons bien assurer que Dieu peut faire tout ce que nous pouvons comprendre, mais non pas qu'il ne peut faire ce que nous ne pouvons pas comprendre; car ce serait témérité de penser que notre imagination a autant d'étendue que sa puissance.'

[90] Though Descartes would contest this characterization – cf. AT, I, 144. Note that the analogy between the laws of nature established by God and the laws of a kingdom instituted by a king may rest on a moot point, namely, whether the monarch is understood as subject to or as above the laws of the land.

In the second letter Descartes looks at the issue of how human beings are to think about the relationship between 'the mathematical truths' and 'the metaphysical truths' and argues that the former depend on the latter:[91]

> As for the eternal truths, I say, once again, that they are true or possible only because God knows them as true or as possible, and that they are not, on the contrary, known as true by God in such a way that they would be true independently of him. And, if human beings really understood the sense of their words, then they could never say without blasphemy that the truth of anything is prior to the knowledge which God has of it, for, in God, to will and to know are a single thing in such a way that by the very fact that he wills something he knows it and it is only for this reason that such a thing is true. Therefore one must not say that, if God did not exist, then these truths would still be true; for the existence of God is the first and the most eternal of all the truths that there can be and the one from which alone all the others proceed. But it is easy to be mistaken about this, because most human beings do not regard God as a being who is infinite and incomprehensible, and who is the sole author on whom all things depend; rather, they get stuck at the syllables of his name and think that one knows enough about him if one knows that 'God' means the same as what is meant by 'Deus' in Latin, and the same as the one who is adored by human beings. Those who have no higher thoughts than these can easily become atheists; and, because they perfectly comprehend the mathematical truths, but not the truth of the existence of God, it is no wonder that they do not think that the former depend on the latter. But they should rather make the opposite judgment, namely, that, since God is a cause whose power surpasses the bounds of the human understanding, and since the necessity of these truths does not exceed our knowledge, these truths are therefore something less than, and subject to, this incomprehensible power.

Concisely and precisely: Truths are true because God wills them to be; God does not recognize them to be true because they are.[92] Indeed, the metaphysical truth that God exists would be the source of all other truth.

[91] See Letter to Mersenne, May 6, 1630 (AT, I, 149–150): 'Pour les vérités éternelles, je dis derechef que *sunt tantum verae aut possibiles, quia Deus illas veras aut possibiles cognoscit, non autem contra veras a Deo cognosci quasi independenter ab illo sint verae*. Et si les hommes entendaient bien le sens de leurs paroles, ils ne pourraient jamais dire sans blasphème, que la vérité de quelque chose précède la connaissance que Dieu en a, car en Dieu ce n'est qu'un de vouloir et de connaître; de sorte que *ex hoc ipso quod aliquid velit, ideo cognoscit, et ideo tantum talis res est vera*. Il ne faut donc pas dire que *si Deus non esset, nihilominus istae veritates essent verae*; car l'existence de Dieu est la première et la plus éternelle de toutes les vérités qui peuvent être, et la seule d'où procèdent toutes les autres. Mais ce qui fait qu'il est aisé en ceci de se méprendre, c'est que la plupart des hommes ne considèrent pas Dieu comme un être infini et incompréhensible, et qui est le seul auteur duquel toutes choses dépendent; mais ils s'arrêtent aux syllabes de son nom, et pensent que c'est assez le connaître, si on sait que *Dieu* veut dire le même que ce qui s'appelle *Deus* en latin, et qui est adoré par les hommes. Ceux qui n'ont point de plus hautes pensées que cela, peuvent aisément devenir athées; et parce qu'ils comprennent parfaitement les vérités mathématiques, et non pas celle de l'existence de Dieu, ce n'est pas merveille s'ils ne croient pas qu'elles en dépendent. Mais ils devraient juger au contraire, que puisque Dieu est une cause dont la puissance surpasse les bornes de l'entendement humain, et que la nécessité de ces vérités n'excède point notre connaissance, qu'elles sont quelque chose de moindre, et de sujet à cette puissance incompréhensible.'

[92] This will come as no surprise to anyone familiar with the *Bible*. For the Judaeo-Christian God can, even ethically speaking, command human beings to kill (cf., e.g., *Genesis*, ch. 22, v. 2), to steal (cf., e.g., *Exodus*, ch. 12, v. 35), and to fornicate (cf., e.g., *Hosea*, ch. 1, v. 2), etc., and the very fact that he orders it makes it right. For an attempt at a philosophical justification of this radical divine voluntarism in ethics see Aquinas, *Summa theologica*, I–II, ques. 94 ('De lege naturali'), art. 5, obj. and resp. 2.

In the third letter Descartes focuses on the causal relationship between God and the eternal truths as well as on the epistemic relationship between human beings as finite beings and God as an infinite being:[93]

> You ask me by what kind of causality God has established the eternal truths. I reply that it is by the same kind of causality by which he has created all things, that is to say, as efficient and total cause. For it is certain that he is the author of the essence as well as of the existence of creatures, and this essence is nothing other than the eternal truths, which I do not conceive as emanating from God like the rays from the sun; but I know that God is the author of all things and that these truths are something, and, consequently, that he is their author. I say that I know this, and not that I conceive it or that I comprehend it: for one can know that God is infinite and all powerful, even though our soul, being finite, cannot comprehend or conceive him; in the same way, we can well touch a mountain with our hands, but we cannot embrace it as we could a tree or something else that would not exceed the size of our arms. For to comprehend something is to embrace it by one's thought; but to know something, it suffices to touch it with one's thought. You also ask what has necessitated God to create these truths; and I reply that he has been free to make it the case that it not be true that all the radii of the circle are equal – just as free as he was not to create the world. And it is certain that these truths are no more necessarily attached to his essence than are the other creatures. You ask what God has done in order to produce them. I reply that from all eternity he has willed and understood them to be, and, by that very fact, he has created them, or, if you reserve the word 'created' for the existence of things, then he has established them and made them. For, in God, to will, to understand, and to create are the same thing, without the one's being prior to the other even conceptually.

Cognitively speaking, human beings could 'know' but would never be able to 'comprehend' the divine being. Therefore the metaphysical foundations of human knowledge would lie beyond the bounds of human knowledge.

Now what do these metaphysical investigations have to do with the methodological reflections of the *Regula*? Well, the fact that the scope of Descartes' research interests was constantly shifting by late 1629 and by early 1630 should not obscure the fact that he had reached the crucial turning point away from methodology and toward metaphysics in late 1628 and in early 1629. In other words, Descartes has two basic approaches to epistemic foundationalism, namely, the one, methodological, and the other, metaphysical. By 'epistemic foundationalism' is meant the attempt to find a basis

[93] See Letter to Mersenne, May 27, 1630 (AT, I, 151–153): 'Vous me demandez *in quo genere causae Deus disposuit aeternas veritates*. Je vous réponds que c'est *in eodem genere causae* qu'il a créé toutes choses, c'est à-dire *ut efficiens et totalis causa*. Car il est certain qu'il est aussi bien auteur de l'essence comme de l'existence des créatures: or cette essence n'est autre chose que ces vérités éternelles, lesquelles je ne conçois point émaner de Dieu, comme les rayons du soleil; mais je sais que Dieu est auteur de toutes choses, et que ces vérités sont quelque chose, et par conséquent qu'il en est auteur. Je dis que je le sais, et non pas que je le conçois ni que je le comprends; car on ne peut savoir que Dieu est infini et tout-puissant, encore que notre âme étant finie ne le puisse comprendre ni concevoir; de même que nous pouvons bien toucher avec les mains une montagne, mais non pas l'embrasser comme nous ferions un arbre, ou quelque autre chose que ce soit, qui n'excédât point la grandeur de nos bras; car comprendre, c'est embrasser de la pensée; mais pour savoir une chose, il suffit de la toucher de la pensée. Vous demandez aussi qui a nécessité Dieu à créer ces vérités; et je dis qu'il a été aussi libre de faire qu'il ne fût pas vrai que toutes les lignes tirées du centre à la circonférence fussent égales, comme de ne pas créer le monde. Et il est certain que ces vérités ne sont pas plus nécessairement conjointes à son essence que les autres créatures. Vous demandez ce que Dieu a fait pour les produire. Je dis que *ex hoc ipso quod illas ab aeterno esse voluerit et intellexerit, illas creavit*, ou bien (si vous n'attribuez le mot de *creavit* qu'à l'existence des choses) *illas disposuit et fecit*. Car c'est en Dieu une même chose de vouloir, d'entendre, et de créer, sans que l'un précède l'autre, *ne quidem ratione*.'

for knowledge more basic than which none can be based: On the one hand, 'methodological' is an approach that concentrates on how truths come to be known; on the other hand, 'metaphysical' is one that focuses on how truths come to be true. The methodological approach is the earlier, and the metaphysical is the later, for the former is that of the *Regula* (1619–1628), and the latter would be that of the 'Treatise on Metaphysics' (1628–1629) as well as of the 'Metaphysical Correspondence' (1630).[94] Therefore the full turn from methodology to metaphysics occurs in Descartes' thought from 1628 to 1630, and it is this 'turn' which sets the stage for the 'classic' formulation of his philosophy as found in the *Discourse*, in the *Meditations*, and in the *Principles*. Thus even the familiar exposition of 'the principle rules of the method' in the *Discourse on the Method* amounts to hardly more than a flashback.[95] Yet none of this is to be crudely construed as implying that there were no metaphysics in the *Regula* or no methodology in the *Discourse*, for example.

In any case, by the spring of 1630 the seeds of Descartes' theological theory of truth had also already been planted. It is this account of truth, with its accompanying theory of evidence and of knowledge, which then goes on to become the 'classic' Cartesian doctrine of the *Discourse*, of the *Meditations*, and of the *Principles*. According to this account, truth is 'the conformity of thought and of object',[96] all that human beings clearly and distinctly perceive is true, and this is the case because God guarantees it – et cetera.[97] But the following facts about the *Regula*, whose account of knowledge threatens to sink into oblivion, are also remarkable: *First*, there is no reference at all to 'the eternal truths'.[98] *Second*, the expressions 'metaphysics' and 'metaphysical' do not occur even a single time.[99] *Third*, God is mentioned only once – and then merely as part of

[94] Once again, since it is uncertain whether Descartes 'moved' from France to Holland at the end of 1628 or at the beginning of 1629, his claim that 'during the first nine months in Holland he had worked on nothing but metaphysics' – cf. Letter to Mersenne, Apr. 15, 1630 (AT, I, 144) – contains a certain degree of ineradicable indeterminacy. Perhaps it is reasonable to assume that most (if not all) of what was *written* of the 'Treatise on Metaphysics' was *written* in 1629. But to work is not necessarily to write.

[95] Of which see more below.

[96] Cf. Letter to Mersenne, Oct. 16, 1639 (AT, II, 597): '… I, for my part, have never had any doubts about truth [la vérité], because it seems to me that it is a notion so transcendentally clear [une notion si transcendantalement claire] that it is impossible [impossible] to be ignorant of it. … but there is no way to learn what truth is, if one does not know it by nature [de nature]. For what reason would we have for accepting anything which could teach us the nature of truth if we did not know that it were true, that is to say, if we did not know truth? Of course, it is possible to explain [expliquer] the meaning of the word [*quid nominis*] to someone who does not know the language [la langue], and to tell him that the word 'truth' [ce mot *vérité*], in the strict sense [en sa propre signification], denotes [dénote] the conformity of thought with its object [la conformité de la pensée avec l'objet], but that, when it is attributed to things outside thought [choses qui sont hors de la pensée], it means only that these things can serve as the objects of true thoughts [d'objets à des pensées véritables], either ours or God's. But one cannot give any logical definition [aucune définition de logique] which would help to discover its nature [sa nature]. I think the same of many other things which are very simple and which are known naturally … if one tries to define these things, then one only obscures them and causes confusion.' The question is, of course, whether this account of truth can peacefully coexist with the views regarding the 'eternal truths' of the 'Metaphysical Correspondence' of 1630.

[97] Of which see more below.

[98] The *Regula* do not even contain the adjective 'aeternus'.

[99] The *Regula* do not contain the substantive 'metaphysica' or the corresponding adjective. Interestingly, neither do the *Meditations* proper contain the word 'methodus' (cf. AT, VII, 3 and 7).

an example.[100] *Fourth*, there is only one occurrence of 'clarity and distinctness' as a pair, so one can hardly say that there is a 'doctrine of clear and distinct ideas'.[101] *Fifth*, there is no reference to a 'general rule of truth' that whatever one clearly and distinctly perceives must also be true and cannot be false.[102] *Sixth*, since there is no such rule, there is also no claim of a proof or of a demonstration of the same and a fortiori no appeal to God as the guarantor of the relationship between evidence and truth – which are distinctive features of the 'mature' Descartes' thinking on these topics. And these are just several of the many examples of the uniqueness of the *Regulæ* vis-à-vis Descartes' later works. Yet the purpose of the *Regulæ* is also to provide rules for the investigation and for the achievement of the truth of things. In a word, as far as the foundations of knowledge are concerned, the 'Metaphysical Correspondence' and the *Meditations* have much more in common with each other than does either with the *Regulæ* – and this despite the quasi-reversed temporal relations.

As a result, whereas the Descartes of the *Regulæ* is primarily and ultimately interested in methodological issues, the Descartes of the 'Metaphysical Correspondence' is occupied first and foremost with metaphysical inquiries. In other words, the early Descartes was at a crossroads at the end of the 1620's and at the beginning of the 1630's. For, while he would, as a natural philosopher, continue to engage in the scientific study of physical phenomena – that is, in research which, especially in the years from the end of 1630 to the end of 1633, would involve a great deal of frustration on his part –,[103] the nagging question of whether 'first philosophy' (*prima philosophia*) would emerge as methodology or as metaphysics had, in effect, already been answered by his turn away from the topic of method and toward the field of metaphysics.

Therefore, understanding the *Regulæ* 'on their own terms' means precisely not reading them as a text with respect to which it could be assumed that there were a

[100] Cf. R. 12, § 17 (AT, X, 421–422).

[101] Cf. R. 11, § 2 (AT, X, 407): '… ut propositio clare et distincte … intelligatur …'. (But, to be extra fair, see also R. 12, § 13, and R. 16, § 5.) Note that this does not at all amount to a claim that it can be 'proved' or 'demonstrated' that all that which is clearly and distinctly perceived is true. For all the occurrences of 'clare' and 'clarus' (etc.) as well as of 'distincte' and 'distinctus' (etc.) in the *Regulæ* see the Index of the present volume.

[102] Thus I am considerably less sanguine than Gaukroger about finding 'his [Descartes'] doctrine of clear and distinct ideas' in the *Regulæ* (cf. *Descartes: An Intellectual Biography*, pp. 183–184). But it all depends on what one means by 'doctrine', and therefore there is latitude for interpretation on this point.

[103] Cf., e.g., Letter to Mersenne, Apr. 15, 1630 (AT, I, 144–145), where the purpose of the metaphysical reflections on the eternal truths is the investigation of 'the foundations of physics': 'That [the metaphysical question of the use of human reason to acquire knowledge of God and knowledge of the self] is the task with which I began my studies; and I can tell you that I would have never been able to discover the foundations of physics [les fondements de la physique] if I had not looked for them along that path. But it is the topic which I have studied more than any other [la matière que j'ai le plus étudiée de toutes], and … in my physics [en ma physique] I shall touch on several metaphysical questions [plusieurs questions métaphysiques] … .' The 'physics', which Descartes mentions several times in the course of this letter and which he promises to get to Mersenne 'by the beginning of the year 1633' (ibid., p. 137), would turn out to be the unpublishable *Treatise on the World*. See To Mersenne, Nov. 25, 1630 (AT, I, 179): '… la promesse que je vous ai faite, d'avoir achevé mon *Monde* dans trois ans …'.

continuous and uninterrupted development from there to the 'classic' Cartesian works.[104] Thus it also involves performing a hermeneutical epoché by bracketing out a great deal of later context in order to neutralize the danger of projecting it back into the earlier text. Of course, one might also try, for a change, understanding the *Discourse*, the *Meditations*, and the *Principles* in terms of the *Regulæ*.

Text and Context I: The 'Regulæ' and the 'Discourse' (1637)[105]

To be sure, the material overlapping and underlapping between the method of the *Rules for the Direction of the Natural Intelligence* and the rules of the *Discourse on the Method* are remarkable.[106] None the less, to reflect on the formal relationship between these works is already to encounter a pair of factors whose elements are inversely related in a curious fashion. That is, although *chronologically* the *Regulæ* are by far *prior* while the *Discourse* is by far *posterior*, *methodologically* the former is much more *developed* while the latter is much more *rudimentary*. Moreover, the observation on constitution holds not only quantitatively but also qualitatively, since the degree of discrimination of the dozens of rules of the *Regulæ* is almost incomparably higher than that of the handful of rules of the *Discourse*. Prima facie, at least, this is paradoxical.

To begin to explain this apparent reversal of roles, of course, one might point out that the *Regulæ* were scholarly, technical, and esoteric, but that the *Discourse* be popular, pragmatic, and exoteric. Now these factors obviously possess valid but limited explanatory power. Still, a more effective approach would focus, not so much on the disparity, but much rather on the commonality, of these texts, for they are also related as text and metatext. In fact, the *Discourse* does not at all represent a 'progress report' on a methodology that had been discovered recently, that is, in the middle of the decade 1630–1640; rather, it offers a sampling of the rules of that method which Descartes had been following in his scientific research for a long time and which he had already formulated in the *Regulæ* long ago, that is, by the end of the decade 1620–1630. Thus one of the things that Descartes does in the *Discourse* is to report on some of the procedures that he had recorded in the *Regulæ* – but left unpublished. So, although the *Discourse* refers to the *Regulæ*, there is no indication of any intention toward complete coverage.[107] Publication demanded simplification.[108]

[104] For loci where Descartes himself emphasizes the differences – and even the oppositions – between his earlier and later positions cf., e.g., *Author's Replies to the Sixth Set of Objections* (to the *Meditations*), AT, VII, 440–441; Letter to Vatier, Feb. 22, 1638 (AT, I, 561); etc.

[105] In this section I have, inter alia, adapted and improved some formulations from the Interpretive Essay of my earlier edition *Discours de la méthode / Discourse on the Method* – cf. ibid., esp. pp. 138–135.

[106] Cf., e.g., Étienne Gilson (ed.), *René Descartes, Discours de la méthode* (Paris, 1925–1987), pp. 197–214 and 486–490; Leslie John Beck, *The Method of Descartes: A Study of the 'Regulæ'* (Oxford, 1952; New York, 1987), pp. 1 ff. and 149 ff.; etc.

[107] On the contrary. See Letter to Mersenne, Mar., 1636 (AT, I, 339): 'In this project [see *projet*] I reveal a part of my method [une partie de ma méthode] … .' And To Vatier, Feb. 22, 1638 (ibid., p. 559): '… my purpose [mon dessein] was not at all to teach the whole of my method [toute ma méthode] in the discourse [le discours] in which I propose it … .'

[108] See the 'Letter of the Author to the Translator' of the French edition of the *Principia philosophiæ* (Paris, 1647) (AT, IX/2, 15): '… un discours [de] la Méthode … où je mis sommairement les principales règles de la logique …'. Thus the *Discourse* would be but a 'summary'.

Thus the connection between the plethora of complex rules of the *Regulæ* and the paucity of simple rules of the *Discourse* becomes controversial precisely because it would be superficial to regard the latter as merely or essentially a popular summary of the former. For instance, there is the extreme position that, given the determinacy of the method of the *Regulæ* and the indeterminacy of that of the *Discourse*, to look for Descartes' methodology in the latter instead of in the former is to look in the wrong place. Yet this is a matter, not of 'either … or …', but of 'both … and …'. In addition, there is the curious opinion that the *Rules for the Direction of the Natural Intelligence* represent the genuine *Discourse on the Method*.[109] But this cannot be accurate, for neither are the *Regulæ* a *discourse* on method nor is the *Discourse* a *treatise* of rules. After all, neither would the Descartes of the 1620's have written the *Discourse* for himself nor would the Descartes of the 1630's have written the *Regulæ* for others. For each work was produced under circumstances peculiar to it.

Now there surely is – with respect to actually listed rules of method – a certain lack of balance between the rules of the *Regulæ* and the method of the *Discourse*. For there is little in the latter that is not in the former, whereas there is much in the former that is not in the latter. Still, if one were to select only those rules of the *Regulæ* which as directly as possible anticipate the method of the *Discourse*, then one might indeed attempt to establish the following – *nomen est omen* – 'correspondences':[110]

Rules of the *Regulæ*:	Rules of the *Discourse*:
We should attend only to those objects for whose certain and indubitable cognition our natural intelligence seems to suffice. (Rule 2)	The first was never to accept anything as true that I did not evidently know to be such, that is to say, carefully to avoid precipitation and prejudice, and to include in my judgments nothing more than that which would present itself to my mind so clearly and so distinctly that I were to have no occasion to put it into doubt. ('The Rule of Evidence and of Justification')
Concerning proposed objects, one has to investigate, not what others may have felt or what we ourselves shall conjecture, but what we can clearly and evidently intuit or certainly deduce – for knowledge is acquired in no other way. (Rule 3)	
If we would perfectly understand a question, then it has to be abstracted from every superfluous conception,	The second was to divide each of the difficulties that I would examine into as many parts as would be possible

[109] Cf. E. J. Dijksterhuis, *De Mechanisering van het Wereldbeeld* (Amsterdam, 1950), IV, §§ 195–198.

[110] The Latin text of the rules of the *Regulæ* is, of course, provided in the present edition (see below). The French text of the rules of the *Discours* is as follows (cf. AT, VI, 18–19): 'Le premier était de ne recevoir jamais aucune chose pour vraie, que je ne la connusse évidemment être telle: c'est-à-dire, d'éviter soigneusement la précipitation et la prévention; et de ne comprendre rien de plus en mes jugements, que ce qui se présenterait si clairement et si distinctement à mon esprit, que je n'eusse aucune occasion de le mettre en doute. Le second, de diviser chacune des difficultés que j'examinerais, en autant de parcelles qu'il se pourrait, et qu'il serait requis pour les mieux résoudre. Le troisième, de conduire par ordre mes pensées, en commençant par les objets les plus simples et les plus aisés à connaître, pour monter peu à peu, comme par degrés, jusques à la connaissance des plus composés; et supposant même de l'ordre entre ceux qui ne se précèdent point naturellement les uns les autres. Et le dernier, de faire partout des dénombrements si entiers, et des revues si générales, que je fusse assuré de ne rien omettre.'

reduced to its simplest form, and divided up into the smallest possible parts together with an enumeration. (Rule 13)	and as would be required in order better to resolve them. ('The Rule of Analysis or of Resolution')
The whole method consists in the order and arrangement of the things on which the vision of the mind has to be focused in order that we might discover any truth. Yet we shall be following this method exactly if, step by step, we reduce complicated and obscure propositions to simpler ones, and we then try to ascend, through the same steps, from the intuition of the simplest ones of all to a knowledge of all the others. (Rule 5)	The third was to conduct my thoughts in an orderly manner, by beginning with those objects the most simple and the most easy to know, in order to ascend, little by little – as by degrees –, to the knowledge of the most composite ones, and by supposing an order even among those which do not naturally precede one another. ('The Rule of Synthesis or of Composition')
For the completion of knowledge, we should survey, in a continuous and completely uninterrupted movement of thought, all the things that relate to our project, together and individually, and we should also summarize them in a sufficient and orderly enumeration. (Rule 7)	And the last was everywhere to make enumerations so complete and reviews so general that I were assured of omitting nothing. ('The Rule of Enumeration and of Review')

Ironically, the twin phenomena of overlapping and of underlapping also represent the reason why there is no profound conflict between the fact that the *Regulæ* were earlier while the *Discourse* was later, on the one hand, and the fact that the rules of the method of the latter are more rudimentary while those of that of the former are more developed, on the other hand. For the author of the *Regulæ* is ultimately interested in the discovery of a method that *will be* applied in scientific research, whereas the author of the *Discourse* is primarily concerned with the presentation of the method that *has been* applied for scientific results (partially published in the *Essays*).

Therefore the *Discourse* is neither Descartes' first nor his final word on methodology. Rather, it represents a key stage of a development that was occurring before it and that was going to continue after it. Only a synchronic reading of the writing would tempt one to absolutize its statements, whereas a diachronic understanding will encourage one to relativize them. To every text there is a context. Thus the genealogy of 'this method' is not a movement from no method at all to the definitive method, but rather a transition from a vague and obscure anticipation of some rules to the clear and distinct possession of the method. Yet such a striving ceases to be philosophical as soon as those engaged in it believe that the fulfillment of their intentions has achieved final closure. And it would be an uncharitable interpretation to think that Descartes thought otherwise. So Descartes is essentially correct when he states in the *Discourse* that he had been following 'this method' much earlier.[111] For the rules of the *Regulæ* and the method of the *Discourse* are formulated in such a tightly interlocking manner that this claim is easily legitimated.

Thus the movement from the principles of the *Regulæ* to the method of the *Discourse* is a transition from 'the more difficult for us but more facile in itself' to 'the more

[111] Cf., e.g., AT, VI, 19–22, 28–30, etc.

facile for us but more difficult in itself'. To be sure, these works do present essentially the same method; none the less, they do so by way of overlappingly and underlappingly different rules. Also, there is no comparison between their respective reflections in terms of length, breadth, and depth. As far as philosophical methodology in the rigorous sense is concerned, then, the *Regulæ* enjoy unambiguous primacy over the *Discourse*. Yet the *Discourse* does provide invaluable hints at understanding the *Regulæ* – clues not available elsewhere. So one has to zigzag between these texts in order to get a definite sense of Descartes' method. Finally, one must deny that the *Discourse* contains the definitive account of 'the method', but this is not to assert that the *Regulæ* do so.

In regard to rules, it remains to remark that, while the four rules of the method that are set forth in the second part of the *Discourse* may be 'the principal rules of the method' as laid down there, they are not the only methodological 'rules' that figure prominently in the work. For there is another rule, which is not less important than any of these. Namely, in the fourth part – generalizing from the connection between evidence and truth that he claims for the justification of his dictum 'I think, therefore I am' – Descartes says that '*I judged that I could take for a general rule that the things that we conceive very clearly and very distinctly are all true*'.[112] This is a fateful statement, and Descartes would subsequently spend a lot of time attempting to substantiate it.[113] Indeed, already in the *Discourse* Descartes argues – without claiming to demonstrate or to prove it – that one can be assured of the validity of this rule only because God exists, because he is a perfect being, and because – epistemically – whatever one possesses one obtains from him.[114] Conspicuously, the *Regulæ*, which precede the *Discourse*, do not posit any such human rule of evidence or any such divine guarantee of truth, while the *Meditations*, which follow it, do.

Text and Context II: The 'Regulæ' and the 'Meditations' (1641)[115]

If the *Regulæ* may be regarded as the exemplary text of the early Descartes, then the *Meditations* can be viewed as fulfilling essentially the same function for the mature Descartes. As has already been intimated, the *Meditations on First Philosophy* appear to have originated as 'a little treatise on metaphysics' – focusing on the existence of God and on the immortality of the human soul as the foundations of metaphysics – with which

[112] See ibid., p. 33 (emphasis added): '... *je jugeai que je pouvais prendre pour règle générale, que les choses que nous concevons fort clairement et fort distinctement sont toutes vraies* ...'. Cf. ibid., p. 36.

[113] Note that Descartes does not say 'that we clearly and distinctly perceive all the things that we perceive', for there are many things that human beings perceive which they perceive only vaguely and obscurely. Cf., e.g., AT, VI, 37–38, where there is a sharp juxtaposition of 'une assurance morale' and 'une certitude métaphysique'.

[114] See ibid., pp. 38–39: 'For ... that which I have already taken for a rule [pour une règle], namely, that the things that we conceive very clearly and very distinctly are all true [que les choses que nous concevons très clairement et très distinctement sont toutes vraies], is assured only because God is or exists, because he is a perfect being, and because all that which is in us comes from him.' In the *Discourse* Descartes chooses not to use terms like 'démontrer' and 'prouver' to describe the force of this argument.

[115] In this section I have, inter alia, adapted and improved some formulations from the Introduction to my earlier edition *René Descartes, Meditations on First Philosophy: A Monolingual Edition* (Notre Dame, 1992) – cf. ibid., esp. pp. 1–9.

Descartes was occupied after having moved from France to Holland.[116] For the linkage between the treatise and the *Meditations* is that the fourth part of the *Discourse on the Method* is a report on the contents of the treatise as well as that this part of the *Discourse* is that one between which and the *Meditations* there is the most material and thematic continuity.[117] Indeed, from the autumn of 1639 to the spring of 1640 Descartes was writing a 'Treatise on Metaphysics' or an 'Essay on Metaphysics' which was intended to elucidate this part of the *Discourse* and which gradually approximated less and less the size of that part and more and more that of the *Meditations*.[118] Thus Descartes felt able to claim that he had been working on 'the subject' of the *Meditations* 'all [his] life'.[119]

As is well known, the order of Descartes' reasoned arguments in the *Meditations on First Philosophy*, whose purported purpose is just to prove the existence of God as well as to demonstrate the distinction of the human soul from the body,[120] might be arranged in the following manner:

Meditation I argues, among other things, that:[121]

First Premiss:	If even the most basic beliefs can be doubted, then so can virtually all beliefs.
Second Premiss:	But even the most basic beliefs can be doubted.
Conclusion:	Therefore virtually all beliefs can be doubted.

[116] On 'the little treatise on metaphysics' see, once again, Letter to Gibieuf, Jul. 18, 1629 (AT, I, 17), and Letters to Mersenne, Dec. 18, 1629 (ibid., pp. 83–95), Apr. 15 and Nov. 25, 1630 (ibid., pp. 135–147 and 178–182), and Feb. 27, 1637 (ibid., pp. 348–351).

[117] Cf. AT, VI, 1 ('... one will find ..., in the fourth [part of the *Discourse*], the arguments by means of which he [Descartes] proves the existence of God and of the human soul, which are the foundations of his [Descartes'] metaphysics ...'), and 31–40; AT, VII, 7 ff. (the 'Preface to the Reader' of the *Meditations*); AT, IX/2, 15–16 ('Later on [after the *Discourse* and the *Essays*], foreseeing the difficulty that many would have in conceiving of the foundations of metaphysics, I [Descartes] tried to explain the principal points thereof in a book of *Meditations* ...'); and AT, V, 153.

[118] Cf. Letter to Mersenne, Jan. 28, 1641 (AT, III, 297), where Descartes refers to the relationship between the *Discourse* and 'his Metaphysics' ('ma *Métaphysique*'), i.e., the *Meditations*. It is especially striking that midway between the publication of the *Discourse* (1637) and that of the first edition of the *Meditations* (1641) – 'long ready but not yet printed' in the summer of 1640: cf. Letter to Mersenne, Jul. 30, 1640 (AT, III, 126) – Descartes speaks about 'un Discours ... de la métaphysique' on which he is working (Letter to Mersenne, Nov. 13, 1639 [AT, II, 622]). Cf. also Letters to Mersenne, Dec. 25, 1639, and Mar. 11, 1640 (AT, II, 629, and III, 39): '... mon Essai de Métaphysique ...'. Sometimes Descartes even lapses into the language of a decade earlier, speaking of 'my little Treatise on Metaphysics' ('mon petit Traité de Métaphysique'), i.e., the *Meditations* (Letter to Mersenne, Sept. 30, 1640 [AT, III, 183]). Moreover, Descartes' plan to print 'something on metaphysics' ('quelque chose de métaphysique') and his intention to clarify 'Part Four of the *Method*' ('la quatrième partie de la *Méthode*') were intimately associated (cf. Letter to Huygens, Jul. 31, 1640 [AT, III, 751]). Finally, see AT, V, 153.

[119] See Letter to Mersenne, Oct. 16, 1639 (AT, II, 596): '... un sujet [metaphysics] auquel j'ai travaillé toute ma vie ...'.

[120] The more ambitious full title of the first edition (1641) reads: '*Meditations on First Philosophy, in which the Existence of God and the Immortality of the Soul are Demonstrated*'. The less ambitious full title of the second edition (1642) reads: '*Meditations on First Philosophy, in which the Existence of God and the Distinction of the Human Soul from the Body are Demonstrated*'. Yet the basic idea still seems to remain the same, to wit, that, by demonstrating that the human soul is really distinct from the body, one eo ipso demonstrates that the human soul is also immortal (cf. AT, VII, 12–14).

[121] Cf. esp. Synopsis, § 1, Meditation I, §§ 9–12, III, § 4, VI, § 24, etc. Contrary to the impression conveyed in some places, the meditative doubt at issue is not universal, but hyperbolic.

Meditation II argues, among other things, that:[122]

First Premiss:	If I (am) think(ing), then I am.
Second Premiss:	But I (am) think(ing).
Conclusion:	Therefore I am.

Meditation III argues, among other things, that:[123]

First Premiss:	I exist as an imperfect being.
Second Premiss:	But I have an idea of God as a perfect being.
Conclusion:	Therefore God exists.

It argues, then, that:[124]

First Premiss:	All that which I very clearly and distinctly perceive is true.
Second Premiss:	But the idea of God that I have is that idea which I perceive most clearly and distinctly of all the ideas that I have
Conclusion:	Therefore the idea of God that I have is the most true idea of all the ideas that I have.

It argues, finally, that:[125]

First Premiss:	God is a perfect being.
Second Premiss:	But deception implies imperfection.
Conclusion:	Therefore God has nothing to do with deception.

Meditation IV argues, among other things, that:[126]

First Premiss:	God is the author of all clear and distinct perceptions.
Second Premiss:	But God is veracious.
Conclusion:	Therefore every clear and distinct perception is veridical.

[122] Cf. Meditation II, §§ 3 and 6, III, § 9, IV, § 10, etc. Of course, the concise, precise formulation, 'cogito, ergo sum', does not occur in the *Meditations*. But see *Discourse*, AT, VI, 32–33, and *Principia philosophiae*, AT, VIII/1, 7–8.

[123] Cf. the enthymematic formulation of the first argument for the existence of God in Meditation III, § 36, as well as III, § 38, and IV, § 1. Here the second premiss vastly underestimates the problem of whether an imperfect being can have an accurate and adequate idea of a perfect being.

[124] Cf. Meditation III, §§ 2 and 25. Here the second premiss may be even harder to accept than the first. For there is much that speaks for the vagueness and obscurity of human beings' ideas of God.

[125] Cf. Meditation III, § 38, and IV, § 2. Here the second premiss lapses into moralizing. According to the account of the fall in *Genesis*, chs. 2–3, to doubt the divine veracity is to violate one of the basic tenets of Judaeo-Christianity. For the first human beings of the *Bible* were given two conflicting accounts of what would happen to them if they were to eat of the fruit of the forbidden tree, namely, that of their maker, that is, that they would die, and that of their tempter, that is, that they would become divine. For some reason, they both preferred to believe, and chose to act on, the latter. Therefore, even before they did anything against the will of God, they had already fallen. Thus there is a big difference between the fall and the primordial sin of the first human beings. They would not have violated the promulgated will of God in their actions if they had not already withdrawn their trust in his word. Of course, Descartes steadfastly refuses even to meditate seriously against the Judaeo-Christian God.

[126] Cf. Meditation IV, § 17. In lieu of a cogent argument for the divine veracity posited by the second premiss, this argument remains wobbly. Yet one way to make sense of the first premiss – at least from the perspective of Judaeo-Christianity – is to look at it in this way: God is the creator of all creatures. Some creatures are human beings. Human beings are created with cognitive faculties. The application or operation of these faculties results in perceptions. Some of these perceptions are clear and distinct. Therefore God is the – indirect, mediate, and ultimate – author of these perceptions. *On the other hand*, if God is the author of all perceptions, then he is the author, not only of those that are clear and distinct, but also of those that are vague and obscure. In the final analysis, then, even Descartes is forced to restrict the scope of his claims about the veracity of God – which he admits (cf. Meditation VI, §§ 18–23).

Meditation V argues, among other things, that:[127]

First Premiss:	The essence of God is to possess all perfections.
Second Premiss:	But existence is a perfection.
Conclusion:	Therefore God exists.

Meditation VI argues, among other things, that:[128]

First Premiss:	The teaching of nature informs me that the ideas of sensible things in me come from sensible things outside me.
Second Premiss:	But God, the source of the teaching of nature, is not a deceiver.
Conclusion:	Therefore corporeal things exist.

Due to the constraints of this context, each argument has been presented in its short form. Even so, they enjoy immunity from banalization.

Now there are the arguments of the parts, and there is the argument of the whole. Ironically, it directly concerns, neither the existence of God nor the real distinction of the human soul from the body, but what must be called 'the general rule of truth'. For in the *Meditations* Descartes frankly announces that he intends 'to prove'[129] or 'to demonstrate'[130] the validity of 'a general rule',[131] to wit, of 'the rule of truth',[132] namely, that 'whatever is (very) clearly and (very) distinctly perceived must necessarily be true and cannot possibly be false'.[133] Thus the task is to certify that genuine evidence yields knowledge – or to legitimate the ideal of absolute, adequate, and apodictic knowledge by ascertaining its reality.[134]

Indeed, Descartes is very careful about exactly when, where, and how he substantiates 'the general rule of truth'. For instance, at the beginning of Meditation III he is aware that he is justified in saying only that 'I now *seem to be able* to establish as a general rule that all that which I very clearly and distinctly perceive is true'[135] – since at this point he has not yet demonstrated it.[136] However, this does not prevent him from

[127] Cf. Meditation V, §§ 7–12. The difficulty besetting the second premiss is well known.

[128] Cf. Meditation VI, § 10, i.e., the argument for the existence of the external world. Note the big difference between Descartes' justification of the veracity of very clear and distinct perceptions and his explanation of the reliability of ideas of sensible things. The former appeals to the natural light (*lumen naturale*) of reason, whereas the latter refers to the teaching of nature (*doctrina naturae*) via impulses. The crucial shift of focus from the one aspect of human knowledge to the other occurs in Meditation VI, § 10 ff.

[129] See Synopsis, §§ 2 and 4 ('probare').

[130] See Synopsis, § 2, and Meditation V, § 6 ('demonstrare').

[131] See Meditation III, § 2 ('regula generalis').

[132] See Meditation V, § 15 ('regula veritatis').

[133] See Synopsis, §§ 2 and 4, Meditation I, §§ 9–12, II, §§ 3 and 6, III, §§ 2, 4, 9, 16, 25, and 38, IV, §§ 1–2, 10, 12, and 15–17, V, §§ 6–7 and 11–15, VI, §§ 6–7, 9–10, 11–16, and 23–24, etc.

[134] But, of course, not in all cases whatsoever. Once again, there is a significant difference between the things that human beings can perceive (very) clearly and distinctly and the things that they cannot. In the *Meditations* the evidence of 'clarity and distinctness' pertains, properly speaking, not to 'the teaching of nature' (*doctrina naturalis*) – which can and often does involve uncomfortably high levels of vagueness and obscurity –, but to 'the natural light' (*lumen naturale*). Descartes understands the latter as the realm of infallibility pertaining to the thinking thing and the former as the area of fallibility pertaining to the thinking and extended composite. Cf., e.g., III, §§ 8–12, and VI, §§ 10–24.

[135] See III, § 2 (emphasis added): '... ac proinde iam *video* pro regula generali *posse* statuere, illud omne esse verum, quod valde clare et distincte percipio.'

[136] See Synopsis, § 2, where Descartes says that 'before the Fourth Meditation' he was 'unable to prove' that 'all the things that we clearly and distinctly understand are true in that manner in which we understand them'.

presupposing the validity of 'the general rule of truth' during the proof for the existence of God later in the same meditation. For in the midst of his main proof for the existence of God[137] he anticipates the objection that the idea of God on which the cogency of the argument depends, though it might be clear and distinct, could still be false, with the response that this would be impossible – because this idea be the most clear and distinct, and therefore the most true, of all ideas.[138] Now he overtly regards the demonstration of the validity of 'the general rule of truth' as being located 'in Meditation IV',[139] at the end of which he states the proof.[140] This is also confirmed by a retrospective claim, which occurs toward the beginning of Meditation V, that the most basic epistemic proposition has already been demonstrated.[141] This means, in turn, that the demonstration of the reliability of 'the general rule of truth' is supposed to occur right between the first proof for the existence of God, which is in Meditation III, and the second proof, which is in Meditation V.

The standard objection to the epistemic procedure of the *Meditations* is, of course, that Descartes is arguing in a circle, namely, by first employing some clear and distinct ideas in particular in order to attempt to establish that God exists and does not deceive, and by then appealing to the existence and veracity of God in order to try to show that all clear and distinct ideas in general are true. In other words, 'the Cartesian circle' consists in the mutually conditional statements that one can be certain that whatever one clearly and distinctly perceives is true only if one is sure that God exists and does not deceive, on the one hand, and that one can be certain that God exists and does not deceive only if one is sure that whatever one clearly and distinctly perceives is true, on the other hand.

As intriguing as the dispute about the virtues or vices of this circle may be,[142] it is surprising how badly it has obfuscated a crucial issue, namely, that it is wayward to try to determine a notion of knowledge without attempting to achieve a concept of evidence. For whatever is adduced in order to legitimate evidence must in turn itself be legitimated by means of further evidence. Thus the validation of some evidence presupposes the validity of other evidence, so that evidence can be validated only by other or more or better evidence.[143] The point is that there can be nothing more epistemically basic than evidence. Therefore the genuinely vicious circularity lies in thinking that there were something other than evidence to which one could appeal in order to stabilize evidence that has become shaky. Yet there is something special about the character of evidence that renders it intrinsically inimical to the foundationalist project of transcending its vagaries, verisimilitudes, and vicissitudes. In other words, evidence is not 'linear' in nature – neither in the vertical sense of coming down to a primary base nor in the horizontal sense of arriving at an ultimate goal. So, as becomes obvious in the case of Descartes' argument in the *Meditations*, the viciousness at issue stems, not from the circularity of the argument itself, but from the gratuitous denial of the circularity.[144] Descartes' real problem is *the evanescence of evidence*.

Here the *Regulæ* play a key role. For their concept of evidence is still uncluttered by the later metaphysical and theological presuppositions. After all, the *Meditations* deliver a theological epistemology by positing God as epistemically more basic than evidence. Indeed, the *Meditations* grow organically out of both the 'Treatise on Metaphysics' and the 'Metaphysical Correspondence', where God is the truth-maker and the truth-keeper because he makes truths true and preserves them thus. On the contrary, the *Regulæ* do not even attempt to argue that there can be a divine guarantee for the universality and for the necessity of the connection between evidence and truth. Therefore human beings are made and held fully responsible for their inferences. Whether truths are true because God wills them to be or whether he wills them to be because they are, is a typical onto-theo-logical concern of the kind that postdates the *Regulæ*.[145]

Text and Context III: The 'Regulæ' and the 'Principles' (1644)[146]

Since it is impossible here to compare and to contrast the *Regulæ* and the *Principles of Philosophy* – both of which were destined to remain fragments – in general, it must suffice to continue to concentrate in particular on the issue that runs like a red thread throughout Descartes' philosophy, namely, the nature of knowledge. To be sure, one should beware of reducing Descartes' philosophy to epistemology; none the less, he himself does not regard knowledge narrowly as having little or nothing to do with mathematics or with physics, for example. In fact, as the *Regulæ* themselves show, the attempt to find an answer to the question about knowledge has a universal and ineluctable relevance seldom encountered in other issues. In any case, the nature, acquisition, and limits of human knowledge is the single most important topic of the *Regulæ*.

Now, proceeding on the hypothesis that Descartes' position on knowledge did undergo a systematic development from the *Regulæ* – via the 'Treatise on Metaphysics', the 'Metaphysical Correspondence', the *Discourse*, and the *Meditations* – to the *Principles*,

[137] Cf. Synopsis, § 3: '... meum praecipuum argumentum ad probandum Dei existentiam ...'.

[138] Cf. III, § 25, passim.

[139] See Synopsis, § 4: 'In quarta [Meditatione], probatur ea omnia quae clare et distincte percipimus, esse vera ... .'

[140] See § 17.

[141] See § 6: '... et iam fuse demonstravi illa omnia quae clare cognosco esse vera.' To be sure, this formulation does not explicitly say that 'I have already demonstrated in detail that all those things which I clearly *and distinctly* cognize are true'. None the less, the reference to 'the general rule of truth' is unambiguous and one must assume that here Descartes is using 'clare' as shorthand for 'clare et distincte'. Here one also has to consider that in the *Meditations* Descartes does not focus on the problem of the relationship between the clarity of a perception and the distinctness of the same with that degree of discrimination which he employs in this regard in the *Principles*. Of which see more below.

[142] Cf., e.g., AT, VII, 124–126 vs. 140 & 146; 214 vs. 245–246; 277–279 vs. 361–362; 418–419 vs. 444–445; 399 & 405 vs. AT, IX/1, 211; AT, V, 148 vs. 149 & 178; etc.

[143] Cf. Ludwig Wittgenstein, *Über Gewißheit / On Certainty*, ed. G. E. M. Anscombe and G. H. von Wright (Oxford, 1969), § 672: '"Wenn ich *der* Evidenz nicht traue, warum soll ich dann irgendeiner Evidenz trauen?"'

[144] In any case, since no author as such has the final authority, de facto or de jure, over the interpretation of what they have written, the reader is free to interpret the epistemology of Descartes' *Meditationes* as a *reductio ad absurdum* of one version of theological foundationalism.

[145] Cf., once again, Letters to Mersenne, Apr. 15 (AT, I, 135–147), May 6 (ibid., pp. 148–150), and May 27, 1630 (ibid., pp. 151–154).

[146] In this section I have, inter alia, adapted and improved some formulations from the Introduction to my earlier edition *René Descartes, Meditationes de prima philosophia / Meditations on First Philosophy: A Bilingual Edition* (Notre Dame, 1990) – cf. esp. ibid., pp. 36–42.

it is safe to say that this account of knowledge as veridical doxa legitimated by adequate evidence involves the following evolution: First, in the *Regulæ* 'all knowledge' is apprehended as 'certain and evident cognition',[147] whereas there is neither any statement of a general rule to the effect that whatever human beings clearly and distinctly perceive is also true nor any argument to the effect that God guarantees that it be so. In fact, in the *Regulæ* God does not appear to have very much at all to do with what constitutes knowledge.

Then, in the 'Metaphysical Correspondence' Descartes has God both make and keep truths true, for, in the case of a primary and ultimate set of truths, to wit, the eternal truths, the deity both creates and preserves them, and, in this sense, already guarantees their existence and validity. Thus, too, there could hardly be human verities without the divine veracity.

Next, in the *Discourse* Descartes claims as a general rule that the things that human beings conceive very clearly and very distinctly are all true, he couples clarity and distinctness systematically as the criterion of truth, and, in doing so, he appeals to the supernatural assistance of the divine veracity, whereas he refrains from claiming *expressis verbis* that he were proposing a 'demonstration' of or a 'proof' for the universality and necessity of the rule-governed connection between evidence and truth.

Furthermore, in the *Meditations* Descartes repeatedly asserts that the general rule of truth, namely, that all those things which human beings clearly and distinctly perceive are also true, and, to be sure, in that very manner in which they clearly and distinctly perceive them, has been, is being, or will be, 'demonstrated' or 'proved', and, once again, he appeals to God as the author of all clear and distinct perceptions and thus as the guarantor of the validity of the said rule, whereas he offers no definitions of the basic concepts of evidence, namely, 'clarity' and 'distinctness'.

Finally, in the *Principles* Descartes, still wrestling with the specter that what seems most evident to human beings might be utterly false,[148] recurs to the doctrine of the eternal truths,[149] he once again appeals to God as the guarantor of the relationship between evidence and truth,[150] he lays down clarity and distinctness as the dual criteria

[147] See R. 2, § 1.

[148] See the hyperbolic formulation of *Principia philosophiæ*, I, § 30: '… the most serious doubt [summa illa dubitatio], which arose therefrom that we did not know whether we might not be of such a nature [natura] that we would err even in those matters which seemed to us to be most evident [evidentissima] …'. Cf., e. g., ibid., I, §§ 5 and 13.

[149] See ibid., I, § 48: 'All the objects of our perception [percepta] may be regarded either as things [res] or as affections of things [affectiones rerum], or as eternal truths [æternæ veritates].' This paragraph lists the former. The next (§ 49) does the latter: 'It is not possible, or even necessary, to enumerate the eternal truths … . … the proposition, "nothing comes from nothing", is regarded … as an eternal truth [veritas quædam æterna] which resides in our mind [in mente nostra], and such truths are termed "common notions or axioms" [communis notio sive axioma]. Of this class [genus] are the following: "It is impossible for the same thing to be and not to be at the same time." "What is done cannot be undone." "He who is thinking cannot but exist while he is thinking." There are innumerable others, all of which it would not be easy to list … .'

[150] See ibid., I, § 13: 'In which sense knowledge [cognitio] of all other things depends on the knowledge [cognitio] of God.' And I, § 29: 'God is not the cause of errors [causa errorum].' Finally, I, § 30: '… the light of nature [lumen naturæ] or faculty of knowledge [facultas cognoscendi] which God has given to us can never encompass any object which were not true in so far as it is indeed encompassed by this faculty, that is, in so far as it is clearly and distinctly perceived [clare et distincte percipitur]. For God would deserve to be called a deceiver [deceptor] if the faculty which he had given to us were so perverse [perversa] that it mistook the false for the true even when we were using it properly.' Cf. I, § 31 ff.

[151] See ibid., I, § 30: '… all the things that we clearly perceive [omnia quæ clare percipimus] are true … .' And I, § 43: 'We never err when we assent only to the things that have been clearly and distinctly perceived [solis clare et distincte perceptis].' Finally, §§ 33 and 44 describe what is likely to happen if one judges about things perceived only vaguely and obscurely.

[152] Once again, there is a distinction between moral certainty and absolute certainty (ibid., IV, §§ 205–206). 'Moral' (*moralis*) certainty suffices for the practice of life, whereas 'absolute' (*absolutus*) certainty makes use of the metaphysical foundation (*fundamentum metaphysicum*) that God – benevolent, veracious, and creative – guarantees the reliability of the human cognitive faculties properly employed.

[153] See ibid., I, § 45: 'What is a "clear perception" [perceptio clara] and what is a "distinct perception" [perceptio distincta]? … Of a perception which can be used as the basis for a certain and indubitable judgment [certum et indubitatum judicium] it is required, not only that it be clear, but also that it be distinct. I call a "clear perception" one which is present [and overt to the attentive mind [menti attendenti præsens et aperta]: just as we say that we see those things clearly which, being present to the intuiting eye, stimulate it strongly and overly enough. And I call a "distinct perception" one which, when it be clear, is so distinguished from all other perceptions and so precise [ab omnibus aliis ita sejuncta et præcisa] that it contain within itself nothing other than what is clear.' And § 46: 'The example of pain [dolor] shows that a perception can be clear without being distinct, but cannot be distinct without being clear. … For example, when one feels an intense pain, the perception that one has of it is indeed very clear [clarissima], but it is not always distinct. … Hence a perception can be clear without being distinct, but not distinct without being clear.'

[154] Cf. R. 2, §§ 1, 2, and 5 (2x); R. 3, R. 3, §§ 1, 3 (2x), and 7–8 (2x in 8); R. 4, § 4; R. 5, § 2; R. 7, §§ 4–6; R. 8, § 4; R. 10, §§ 3–8; R. 12, §§ 14, 16, and 22–24 (2x in 23); R. 14, §§ 6 and 14; R. 15, § 1, and R. 16, § 5.

[155] See *Meditationes*, Synopsis, § 1, Meditation I, §§ 1–2, II, §§ 1 and 4, etc.

Third, Descartes never – not even in the *Regulæ* – poses the decisive question: 'What is evidence?' Had he done so, he would have had a better chance of grasping the intrinsic inadequacy of his entire 'mature' – *lucus a non lucendo* – account of knowledge. For, since knowledge inevitably involves evidence, no account of knowledge can suffice which does not take seriously the centrality of evidence. The point here is not that Descartes should have tried to give a single universally valid definition of 'evidence',[156] but rather that he might have focused on something without consideration of which knowledge cannot be made to make much sense.

So the development sketched is one in which Descartes, in trying to articulate the nature, acquisition, and limits of human knowledge, attaches decreasingly less weight to evidence, and increasingly more, to God. Thus, whereas the *Regulæ* appeal extensively to evidence but hardly mention God, the *Meditations* proper do not use the word 'evidentia' even once yet appeal to God on almost innumerable occasions. The movement is from the *problem* of a multitude of complex rules, thirty-six, to be exact, which do not really guarantee the human, all too human, achievement of truth, to a 'solution' involving a divine guarantee for – 'e pluribus unum' – a single, simple 'general rule of truth'. From this, one legitimate inference is that, the more 'advanced' Descartes' theory of knowledge becomes, the farther it removes itself from specifically epistemological and methodological concerns and the more inextricably entangled it becomes in theological and metaphysical matters. In fact, it is no exaggeration to say that in the end Descartes seeks the foundations of epistemology in theology by elaborating what amounts to 'a theological theory of evidence'.[157]

Thus the Descartes of the *Regulæ* does not flee from philosophy to theology in order to propose solutions to the problems connected with the fact that evidence is rarely, if ever, *absolute* or *adequate* or *apodictic* – to say nothing of its being all three at once. Nor is he very fond of the facile examples of 'triple-A type' evidence,

[156] The dangers of such an enterprise are exposed, intentionally or not, in the *Theaetetus*, where the grasp at the universal (cf., e.g., 145 c–148 e) leads, not only to contempt for specific differences (cf., e.g., 200 d–201 c), but also to the notion that the individual is inexpressible (cf., e.g., 208 c–210 b).

[157] Cf. Edmund Husserl, *Die Idee der Phänomenologie. Fünf Vorlesungen* (1907), ed. W. Biemel (The Hague, 1950 – Husserliana vol. II), *Erste Philosophie (1923/24). Erster Teil: Kritische Ideengeschichte*, ed. R. Boehm (The Hague, 1956 – Hua. VII), *Erste Philosophie (1923/24). Zweiter Teil: Theorie der phänomenologischen Reduktion*, ed. R. Boehm (The Hague, 1959 – Hua. VIII), *Formale und transzendentale Logik. Versuch einer Kritik der logischen Vernunft* (1929), ed. P. Janssen (The Hague, 1974 – Hua. XVII), *Cartesianische Meditationen. Eine Einleitung in die Phänomenologie* (1931), ed. S. Strasser (The Hague, 1950 – Hua. I), and *Die Krisis der europäischen Wissenschaften und die transzendentale Phänomenologie. Eine Einleitung in die phänomenologische Philosophie* (1936), ed. W. Biemel (The Hague, 1954 – Hua. VI). Thus phenomenology is not a brand of Neo-Cartesianism. To be sure, the *Cartesian Meditations*, perhaps Husserl's most widely read work, grew out of lectures held at the Sorbonne and first appeared as: *Méditations cartésiennes. Introduction à la phénoménologie*, trans. A. Koyré, E. Levinas, and G. Peiffer (Paris, 1931). None the less, even here Husserl asserts from the outset that he rejects virtually the entire content of the Cartesian philosophy – and this holds especially for what has to do with 'evidence'. But author's intent and reader's response are two different things. Cf. my study 'An Essay in Epistemic Kuklophobia: Husserl's Critique of Descartes' Conception of Evidence', *Husserl Studies*, vol. 13 (1997), pp. 89–140.

knowledge, and truth for which he would later become (in)famous.[158] On the contrary, the *Regulæ* provide no quick and easy cures for the epistemic infirmities which plague the 'mature' Descartes, namely, that evidence is *relative* because the temporal dimension alone renders it subject to incessant revision by further evidence,[159] *incomplete* because all clarity and distinctness exist under a comprehensive horizon of vagueness and obscurity,[160] and *questionable* because hardly anything can be proved 'beyond a reasonable doubt' – after all, *reasonable doubt presupposes reasonable doubters*.[161] All three leitmotifs have in common that evidence is a matter of degrees, of grades, and of levels, and that the criteria for what is to count as 'evident' can vary, not only by discipline, but also by object of study within the same. In no case can one employ method as the means to the end of establishing the monarchy of a mathematical measure over all matters.[162] To be sure, the Descartes of the *Regulæ* may not fully appreciate all this. None the less, he also does not claim to be an epistemic Baron von Münchhausen.[163]

Now the reasons for the metamorphosis from methodology to metaphysics are multifarious. Here what counts is that the best way to become acquainted with the *critical* Descartes is by studying the *Regulæ*. For this Descartes – though not nearly as familiar to many – is at least as philosophically stimulating as the *dogmatic* Descartes of the *Meditations*.

[158] Cf., e.g., the notorious case of, say, '2 + 2 = 4', as suggested in the *Discourse* (AT. VI. 21): 'In this [i.e., in systematic attempts to arrive at solutions to problems in geometrical analysis and in algebra] I shall not appear to you to be too vain, perhaps, if you will consider that, there being but one truth with respect to each thing, whoever finds it knows as much about it as one can know about it; and that, for example, a child who has been instructed in arithmetic and who has made an addition following its rules can be assured of having found, concerning the sum that he was examining, all that which the human mind would know how to find.' The point is that not only is the underlying epistemic model suggested here not transferable to other domains, but it is also not even valid for mathematics in general.

[159] On the problem of the duration of the validity and thus of the reliability of evidence over time cf., e.g., Meditation V, §§ 13–16, as well as AT. VII, 124–126, 140–141, 143–146, 214, and 245–246.

[160] For a trenchant analysis of how the lower forms of evidence provide the background to the higher ones cf., e.g., Meditation IV, passim, a seminal text on the horizontality of consciousness.

[161] Cf., e.g., the legal definition of 'reasonable doubt' in the Anglo-Saxon sense (emphasis added): '*A "reasonable doubt"* is such a doubt as would cause *a reasonable* and prudent *man* in the graver and more important affairs of life to pause and hesitate to act upon the truth of the matter charged.' See *Black's Law Dictionary*, ed. H. C. Black et al. (St. Paul, 1990), p. 492 (also pp. 161 and 1265). As Descartes' *Meditations* show, the question about the constitution of reasonable doubt leads directly into the problem of the nature of human rationality.

[162] Cf. the genial insight of Aristotle on this point, *Nicomachean Ethics*, 1094 b 10–1095 a 13.

[163] Cf. Hans Albert, *Traktat über kritische Vernunft* (Tübingen, 1968/1991), passim. In the 'Münchhausen Trilemma', directed against epistemic foundationalism, there are three unacceptable consequences to which the postulate of a sufficient 'justification' ('Begründung') is supposed to lead: (1) an infinite regress, (2) a logical circle, or (3) the breaking-off of the procedure at a certain point. The first is impracticable, the second, problematic, and the third, the most acceptable under the circumstances, though it threatens to degenerate into dogmatism – as, it may be added, with Descartes' 'mature' approach. The locus classicus for the trilemma is found in Sextus Empiricus, *Outlines of Scepticism*, bk. I, ch. XV (cf. bk. II, ch. III ff). Cf. also Montaigne, 'An Apology for Raymond Sebond', *Essays*, ed. and trans. M. A. Screech (London, 1987/1991), bk. II, ch. 12, pp. 679–680.

Philosophy: The Architectonic Argument of the 'Regula'

Perhaps the single most important thing to remember in trying to understand the *Regulæ* is that they represent only a fragment. Now it is an old topos in hermeneutics that understanding is an inherently, but not viciously, circular procedure.[164] That is, one cannot understand the whole, which comprises the parts, until one has understood the parts, which compose the whole – and vice versa. In the case of that whole which lacks some parts, the difficulty is exacerbated. Still, one has no other choice but to begin with a preliminary understanding of what is to be understood. So what peculiar logic of parts and wholes lies at the roots of the *Regulæ*?

If one follows Descartes' intentions regarding the structure and content of the *Regulæ* as indicated in Rules 8 and 12,[165] then one can say, once again, that the work as a whole was originally meant to contain three parts, each one comprising twelve rules. The first part, composed of Rules 1 through 12, is almost complete, with only two apparently minor lacunæ, the one in the middle of Rule 8 and the other toward the end of Rule 12.[166] But already the second part, which would be composed of Rules 13 through 24, is significantly incomplete, for only Rules 13 through 17 are complete (with the exception of a lacuna in the middle of Rule 13),[167] while, on the other hand, Rule 18 itself may be incomplete (with a possible lacuna at the end);[168] also, this set ends abruptly at Rule 21, and only the headings of Rules 19, 20, and 21 are given – indeed, Rules 22, 23, and 24 are completely missing. Yet the final set of twelve rules, which would have comprised Rules 25 through 36, does not appear any longer to exist at all – if it ever did. Thus the project was left unfinished – and substantially so.

Now the first set of twelve rules is concerned with 'simple propositions' as well as with the two modes of inference by means of which they are known, namely, intuition and deduction. Thus this part could have well been entitled: 'On How To Infer Methodically'. The second set of twelve rules deals with those 'problems' or 'questions' in which the object under investigation is a unique function of the data and which can be expressed in the form of an equation. Problems of this sort are confined mainly and mostly to the sphere of mathematics. Thus this part could have fittingly been entitled: 'On Perfectly Understood Questions'. The third set of twelve rules would have treated of those 'problems' or 'questions' which, due to the heterogeneity of the data involved, resist expression in the form of an equation. Problems of this sort play a prominent role

[164] On the hermeneutical significance of the logic of parts and wholes see Husserl, *Logische Untersuchungen* (1900/1901), vol. II, pt. 1, *Untersuchungen zur Phänomenologie und Theorie der Erkenntnis* (Husserliana vol. XIX/1), ed. U. Panzer (The Hague/Boston/Lancaster, 1984), Third Investigation; Martin Heidegger, *Sein und Zeit* (Halle a. d. Saale, 1927), § 2 ff.; and Hans-Georg Gadamer, *Wahrheit und Methode. Grundzüge einer philosophischen Hermeneutik* (1960), *Gesammelte Werke*, vol. 1: *Hermeneutik I* (Tübingen, 1986), pp. 76, 179–180, 194–195, 202, 227–228, 296, and 463. Cf. also below, R. 12, § 26, and R. 13, §§ 4 and 6.

[165] For R. 8, §§ 10–11, and R. 12, § 27, see AT, X, 399–400 and 428–430. Many other places provide insight into the structure of the *Regulæ*, e.g., R. 7, § 10 (ibid., p. 392), R. 8, § 1 (pp. 392–393), R. 13, §§ 1–2 (pp. 430–432), R. 14, § 6 (p. 441), R. 16, § 7 (p. 459), R. 17, §§ 1–2 (pp. 459–461), etc.

[166] See AT, X, 396 and 428.

[167] See ibid., p. 434.

[168] See ibid., p. 468.

in the empirical sciences, for example, in physics. Thus this part could have appropriately been entitled: 'On Imperfectly Understood Questions'. Therefore the grand plan of the *Regulæ* would appear to consist of Descartes' attempt to show that and how 'imperfectly understood questions' can be reduced to 'perfectly understood questions'.[169] Of course, these observations justify the demand for an answer to the question: Why did Descartes break off the work on the *Regulæ* – because of a realization of the unrealizability of the ideal?

Since both the Latin original and the English translation of this edition are provided with numerous footnotes connecting the texts of the rules externally to their contexts as well as with copious cross-references relating these texts internally to each other, the ensuing remarks seek to offer only a sketch of the logical scaffolding of the *Regulæ* – a kind of 'vade tecum' for the reader à la Theseus' thread through the labyrinth.[170] For, if one were to combine certain formal aspects of the work, some of which are missing, with certain material moments, most of which are available, then one might attempt to outline its structure and content. Thus, in the following remarks, the pattern of interpretation is as follows: There is, first, a paraphrase of the rule; then, a statement of the argument of the rule (italicized); next, a commentary on the rule, in which the sentences of the commentary correspond one-to-one to the paragraphs of the elucidation of the rule; and, finally, a formulation of the decisive question(s) of the rule (also italicized). It is also worth noting that the rules themselves are mostly *normative*, whereas their elucidations are mostly *descriptive*.

Part One, comprising three sections of four rules each, proposes a methodology of inference for simple propositions.

Section One, consisting of Rules 1–4, seeks to establish the general importance of systematic procedure in scientific research.

According to Rule 1, the purpose of studies should be the direction of the natural intelligence toward the formation of reliable and veridical judgments about all the things that it encounters. *The argument is about whether science is to imitate the arts, which are supposed to differ by particular subjects and by specific objects, or to be oriented on wisdom, which is supposed to remain identical regardless of who applies it and to what.* For, to employ a metaphor, 'universal wisdom' (*sapientia universalis*) – which is not to be confused with 'universal mathematics' (*mathesis universalis*) – is said to be no more distinguished by the different subjects and objects to which it relates than the light of the sun is by the variety of the things on which it shines. *Therefore the question concerns the legitimation of science by reference to something other than itself – the idea being that, as the parts compose the whole and the whole comprises the parts, so the sciences compose wisdom and wisdom comprises the sciences.*

According to Rule 2, one should pay attention only to those objects for whose certain and indubitable knowledge the natural intelligence appears to be adequate. *The argument is that it is ignorant to think that one does not (or cannot) know what one does (or can) know.* Depending on the translation, 'knowledge' is defined as 'certain and evident cognition' or 'science' is defined as 'certain and evident knowledge', so that *evidence* emerges as essential. *Arithmetic* and *geometry* are assessed as sciences that exemplify *certain*

[169] See ibid., p. 431: '... omnes quæstiones imperfectæ ad perfectas reduci possint ...'

[170] Cf. R. 5, § 1 (AT, X, 379–380).

and evident – or *perfect* – *knowledge*. The probable syllogisms befitting Scholastic controversies are granted only pedagogical value. Two paths to knowledge are posited, namely, *experience* and *deduction*: the former, which is apprehended as *a kind of observation*, is viewed as *unreliable*, but the latter, which is understood as *pure inference*, is regarded as *infallible*. The certainty of mathematical disciplines is traced to two factors, to wit, that their objects are so pure and so simple that experience cannot render these disciplines uncertain, and that these disciplines consist entirely of conclusions deduced by reason. The conclusion drawn is, not that one should do only mathematics, but that one should study only that with respect to which one can have mathematical certainty. *Therefore the question concerns the legitimacy of the claim that mathematical knowledge is the authoritative standard for all knowledge.*

According to Rule 3, one should, when examining things, investigate only those in regard to which one can achieve evident intuition or certain deduction. *The argument is that one acquires genuine knowledge only through intuition or through deduction.* Searching for knowledge in the books of the ancients has both advantages and disadvantages. For one does not become a philosopher merely by reading philosophy. The vulgar philosophy is criticized as resting on conjecture and characterized as a mishmash of vagueness and obscurity and of clarity and distinctness. But two infallible means of acquiring knowledge are posited, namely, *intuition* and *deduction*. 'Intuition' is understood, not as sensual, but as intellectual, that is, as *the indubitable conceptual act of the pure and attentive mind*. Thus there may be significant differences between the Scholastic and the Cartesian Latin terminology. Also, intuitive evidence and certainty are required of *discursive arguments* as well as of *propositional utterances*. 'Deduction' is understood – since many things are known with certainty without themselves being evident – as *a necessary conclusion of something from something else known with certainty*. Faith is considered an act, not of the intellect, but of the will, and thus it is not a reliable path to knowledge, though it yields certainty on divine revelation. *Therefore the question is going to be about the relationship between intuition and deduction as distinct and autonomous ways of knowing – that is, will there really turn out to be two of them or rather only one?*

According to Rule 4, a method is necessary for investigating the truth of things. *The argument is that one must make use of method in investigating the truth of things.* 'Method' is defined in terms of *certain and easy rules*, rules such that, by following them, one will neither suppose anything false to be true nor fail to arrive at the knowledge, not of everything without further ado, but of everything of which one is capable. But mastery of method appears to presuppose that one know *how to intuit* and *how to deduce*, since one cannot learn from the method how to perform these primary and ultimate operations. *Ancient analytic geometry* and *modern algebraic arithmetic* are described as being nothing other than 'the spontaneous fruits' which have sprung from 'the innate principles of the method'. The decisive desideratum is not the 'mathesis vulgaris' whose objects are mere figures and numbers, but rather a mathematics sui generis which contains both primary rudiments of human reason and ultimate truths pertaining to all subjects whatever. 'Mathesis universalis' is defined as that discipline which thematizes all those things in which some *order* or *measure* is examined, and which explains these things regardless of the particular or specific subject matter in which this *order* and *measure* are found.

The purpose of the treatise is to cultivate the theory and the praxis both of 'mathesis universalis' and of the higher sciences. *Therefore the specific question is whether methodical procedure is a necessary or a sufficient condition for achieving the truth in the sciences, and the general question is about the relationships between method, mathematics, and 'mathesis universalis' – which already are clearly not the same things.*

Section Two, consisting of Rules 5–8, focuses both on the order of the objects of knowledge and on the limits of human knowledge itself.

According to Rule 5, one should, step by step, reduce complicated and obscure propositions to simpler and clearer ones, and, by the same steps, ascend from the intuition of the simplest ones to a knowledge of all the others. *The argument is that the entire method consists in the order of the things on which one must focus the natural intelligence in order to discover any truths about them.* This rule is compared to the thread that guided Theseus through the labyrinth. Yet order may not be clear; it may be obscure. *Therefore the question is raised concerning the importance of the order of states of affairs as expressed in propositions.*

According to Rule 6, one should, in order to distinguish between the simplest things and the complicated ones and to apprehend the former in an orderly manner, observe, in each and every series of things in which one has directly deduced some truths from others, which is the most simple and how the others are more or less or equally removed from it. *The argument is about whether the pertinent order is primarily and ultimately ontological or epistemological.* The suggestion is that the arrangement of all things in certain series ensues on the basis of one consideration, to wit, what can be known from what. All relevant things are divided into *absolute* and *relative*. 'Absolute' is said to be *whatever contains within itself the pure and simple nature* in question as well as whatever is the simplest and easiest thing of all. 'Relative' is said to be *whatever participates in the simple nature* and can by virtue thereof be referred to the absolute in a definite set of relations and deduced from it in a certain series of steps. But 'absolute' is *relative*, for some absolute things are more and some are less so than others, so that one must pursue 'the most absolute'. The *most simple natures* are accessed via *intuition*; *all other natures*, via *deduction*. One must begin with the easy and proceed to the hard – intuition precedes deduction. Several elucidations illustrate this using the example of the relations between continuously proportional numbers: 3, 6, 12, 24, and 48. In conclusion, such relations are also used to illustrate the difference between the 'direct' and the 'indirect' deduction of a proposition, for example, getting from 3 and 6 to 12 versus going from 3 and 48 to 12. *Therefore the question is, not only whether the distinction between the absolute and the relative can be performed so neatly and so cleanly as to yield the required easy, pure, and simple natures, but also whether the distinction between the absolute and the relative – and thus that between the simple natures and all others – is primarily and ultimately real (in the 'ordo essendi') or conceptual (in the 'ordo cognoscendi').*

According to Rule 7, one should, in order to complete knowledge, survey, in a continuous movement of thought, all the things that relate to the pertinent project, both collectively and individually, and one should summarize them in an adequate and orderly enumeration. *The focus shifts from intuition and deduction to enumeration or induction.* The problem is that, the *longer* a chain of deductions becomes, the *harder* it becomes to preserve the integrity of the intuitions underlying them; the solution is an

appeal to *memory*, which is notoriously unreliable, or to *a certain continuous movement of thought*. The latter is held to be better, since a chain of deductions is only as strong as its links of intuition are weak and an interrupted survey yields a collapsed certainty. So there is no complete knowledge without adequate induction. 'Induction' is understood as *an inquiry so thorough and so careful and so accurate that one may certainly and evidently conclude from it that nothing relevant to the posed question has been overlooked*. But now *immediate deduction* appears to reduce to *intuition*, while *mediated deduction* seems to amount to *induction*. The rest of the rule avoids the issue by concentrating on induction, which must not be deficient, that is, liable to error; it must be sufficient, that is, complete and distinct. Yet whether induction needs to be complete and distinct or neither, is a pragmatic matter. Induction also has order. The order can be varied, usually, with latitude for individual choice. In conclusion, there is some – puzzling – indication that with this the core of the treatise has already been presented. *Therefore the question is whether deduction can maintain its own role in knowledge vis-à-vis both intuition and induction.*

According to Rule 8, one should, if one encounters, in a series of things to be investigated, something which the intellect cannot adequately intuit, stop there, not examining the other things which follow, but abstaining from superfluous effort. *The focus shifts from the roots of human knowledge to the limitations of the natural intelligence.* The topic of the limits of human reason leads to the question of when order is necessary and when it is useful. If one must withhold judgment, this recognition is viewed as no less knowledge than is that which reveals the nature of the thing itself. For example, someone who has studied mathematics or philosophy but not physics can only get so far in the attempt to discover the anaclastic line in dioptrics. One cannot solve the problem of the anaclastic without knowing certain other things. Here there are said to be *three modes of knowing*, namely, the *intellect*, the *fantasy*, and the *senses*. In any case, it becomes necessary to inquire as to which objects human reason is capable of knowing. But the resemblance between the procedure of the method and the procedures of the mechanical arts seems to show that these preliminaries – the *Regula* up until now (?) – have yielded only some rough precepts. The question concerning the nature and the limits of human knowledge relates both to *those who can know* and to *the things which can be known*. Here *the intellect alone* is supposed to be capable of knowledge, though it can be helped or hindered by *three other faculties*, namely, by the *imagination*, by the *senses*, and by the *memory*. The things themselves are divided into *most simple natures* and *complex or composite natures*. In conclusion, to apply the method in order to know something is to find what one is seeking, or to recognize why one is not finding it, or to realize that one cannot find it. *Therefore the question is how to determine both the limitations of the natural intelligence and the limits of human knowledge.*

Section Three, consisting of Rules 9–12, thematizes the connections between cognitive faculties, cognitive activities, and cognitive objects.

According to Rule 9, one should focus the natural intelligence on the smallest and easiest things, dwelling on them until one becomes accustomed to intuiting the truth distinctly and perspicuously. *The first rule to focus on intuition per se does so under the rubric of perspicacity*. The question is how best to exercise *the operation of intuition* and to cultivate *the faculty of perspicacity* in the distinct intuition of individual things. The comparison of

mental intuition and *ocular vision* shows that one can neither distinctly intuit nor clearly see many things simultaneously; on the contrary, one must eliminate distractions and concentrate on the simplest and easiest matters. Many have a preference for obscurity over clarity, but those who know recognize the truth equally easily whether they have educed it from a clear and simple subject or from an obscure and complicated one. *In a display of blindness toward the diversity of the forms that knowledge and evidence can and must assume, it is said that one is not to think that one knows what one does not intuit as distinctly as what one knows most distinctly – thus setting the standard of evidence so high that much of what is legitimately taken to be knowledge could not possibly meet it.* It is stressed that the sciences are deduced, not from obscure and complicated matters, but from clear and simple ones, as in the case of the question whether a natural power can instantaneously move from place to place through a medium. Another example is that of causes with opposite effects, making for an abrupt conclusion. *Therefore the question is how to render intuition as perspicacious as possible – but, perhaps, without necessarily demanding that all intuition be as perspicacious as that intuition which is as perspicacious as possible.*

According to Rule 10, one should, in order to render the natural intelligence sagacious, exercise it in regard to both the important discoveries and the trivial artifices of other human beings, especially in regard to those which are ordered. *The focus shifts from perspicacity of intuition to sagacity of deduction.* A good way to develop sagacity of deduction is said to be to practice discovering reasons on one's own instead of listening to others' reasonings. The essence of sagacity is located in the proper observance of the various orders of different things. Not *luck*, but *art*, is identified as the key to solving problems. The precepts of the dialecticians warrant omission because it is impossible to arrive at cogent conclusions without evident inferences. *Dialectic* is placed, not in *philosophy*, but in *rhetoric*, because dialectical syllogisms do not discover any new knowledge, but rather only explain the old. *Therefore the question is how to render deduction as sagacious as possible – yet, once again, perhaps, without necessarily requiring that all deduction be as sagacious as that deduction which is as sagacious as possible.*

According to Rule 11, one should, in case one wants to draw any other conclusions from some simple propositions once intuited, increase the capacity of the natural intelligence as much as possible, and one should do this by running through the simple propositions in a continuous and uninterrupted movement of thought, by reflecting on their mutual relations, and by distinctly conceiving several of them together. *The focus shifts from sagacity of deduction to capacity of inference.* So the relationships between *intuition*, *deduction*, and *induction* do need further clarification. For, once again, *simple and perspicuous deduction* appears to amount to *intuition*, whereas *multifaceted and complex deduction* seems to amount to *induction*. While intuition and induction cooperate so closely that they seem to coalesce into a single operation, what role is left for deduction to play? The lame recommendation is, still, to strengthen *the weak and unstable memory* by means of *a continuous movement of thought*. This continuous movement of thought is supposed to emend the sluggishness of the natural intelligence and to amplify its capacity, which the example of numbers in continuous proportion illustrates. *Therefore the question is how to render inference as capable as possible – but, one last time, perhaps, without demanding that all inference be as capable as that inference which is as capable as possible.*

According to Rule 12, one should – in order to intuit simple propositions distinctly, to recognize things unknown by correctly comparing them with things known, and to do so in such a way as to omit nothing of which human industry is capable – employ all the aids of the intellect, of the imagination, of the senses, and of the memory. *The argument is that there is one identical natural intelligence which manifests itself in many different manners*. So the natural intelligence is understood, not in a narrow sense as *the intellect individually*, but in the broad sense as *the cognitive capacities collectively*. Once again, the two cognitive factors are said to be *those who know* and *the things which are to be known*. *Under Aspect 1*, the first cognitive factor, namely, those who know, is analyzed. *The human being* is apprehended as *a composite of mind and of body*. The intention is to give the most coherent description of the cognitive faculties. *First*, the *external senses*, all parts of the body, passively receive an impression of the shape of the perceived object. In an anticipation of the architectonic argument of the *Regulæ*, it is suggested that the universal role of shape in sensible things presents the possibility of expressing all differences in sensible things in terms of shape. *Second*, the stimulation of an external sense by the figure of a perceived object is transmitted to the *common sense*, also a part of the body. *Third*, the common sense forms in the *imagination* or in the *fantasy*, another part of the body, the figures from the external senses, and, in so far as the fantasy retains these ideas, it is called '*memory*'. *Fourth*, the fantasy is located in the *brain*, in which the motive force of the *nerves* originates, and the fantasy moves the nerves as the external senses do the common sense. *Fifth*, the *same cognitive power* performs *different operations*, for example, sensing, imagining, remembering, and understanding; but it is defined as 'natural intelligence', in the proper sense, in so far as it forms new ideas in the fantasy or gets involved with those already made. If the intellect is not engaged with something corporeal, then it cannot use the senses or the imagination or the (corporeal) memory; if it is, then it must represent it as concisely and as precisely as possible. *Under Aspect 2*, the second cognitive factor, namely, the things which are to be known, is analyzed. The project is to differentiate *simple* and *composite things*, and to identify *certainty* and *falsity*. *First*, 'simple things' are defined as those things the knowledge of which is so perspicuous and so distinct that the mind cannot divide them into more things known more distinctly, for example, shape, extension, and motion. *Second*, these *simple things* are classified as *purely intellectual* (known by an innate intellectual light) or as *purely material* (recognized to be present only in bodies) or as *common* (ascribed to both bodies and spirits and known accordingly). Also, the *privations* and *negations* of the simple natures are themselves counted as simple natures. *Third*, the claim is that the simple natures are known per se and that they never contain any falsity. *Fourth*, the *conjunction* of these simple things is said to be either *necessary*, in which case they are inseparable, or *contingent*, in which case they are separable. *Fifth*, one is supposed to be able to understand nothing but these simple natures and their composition. *Sixth*, composite natures are said to be known either through one's own *experience* or through one's own *composition*. *Seventh*, *composition* is said to occur in *three ways*, namely, through *impulse* or through *conjecture* or through *deduction*. But deduction is described as the only fashion of composition which can be certainly veridical. *First*, evident intuition and necessary deduction do not appear to correspond without further ado to simple natures and to necessary

connections, respectively. *Second*, since one is not supposed to be able to explain things known per se in terms of anything more evident, simple natures are supposed to be intuited, not defined: 'For who does not know what motion is?' *Third*, all human knowledge is characterized as distinct recognition of how the simple natures known per se compose the other things. *Fourth*, thus there would be no genuine distinction between 'clear' and 'obscure' knowledge. Not *fifth* but *eighth*, an incomplete remark does not help to temper the increasing overdetermination of knowledge in favor of intuition versus deduction. In conclusion, *the knowable* is divided into *simple propositions* and *questions*, and *questions* are divided into ones *perfectly understood* and others *imperfectly understood*. *Therefore the question is whether knowledge itself really is – thus an awesome assertion located right in the middle of this rule – a purely intellectual and an utterly indefinable nature so simple that one need only be rational in order to know what it is, for the power and the operations of the natural intelligence do not at all appear to fit this description.*

Part Two, comprising three sections – of which only the first is complete – of four, of five, and of three rules, respectively, proposes to treat of determinate and perfectly understood questions.

Section One, consisting of Rules 13–16, shows how determinate and perfectly understood difficulties are abstracted from subjects as well as how they are reduced to the point where certain sought magnitudes are to be recognized on the basis of their relations to certain given magnitudes.

According to Rule 13, one should, if one wants to understand a question perfectly, abstract it from every superfluous conception, reduce it to its simplest form, and divide it into the smallest possible parts accompanied by an enumeration. *The argument is that it is possible to distinguish between perfectly understood questions, which permit expression in the form of an equation because the data involved are homogeneous, as in mathematics, for example, and imperfectly understood questions, which resist articulation in the shape of an equation because the data involved are heterogeneous, as in physics, for example.* The project is to reduce all *imperfectly understood questions* to *perfectly understood questions*. 'Questions' are defined, in juxtaposition to 'intuitions', as all the things in which the true or the false is found. Not only the queries made by others are counted as questions. And there are various modes of seeking something from something else. One is said to be seeking things from words whenever the difficulty is the obscurity of the language employed, and most philosophical disputes are linguistic. One is said to be seeking causes from effects whenever one is investigating whether something is or what it is. In all questions one is supposed to strive, above all, to understand distinctly what is being sought. For one cannot find what one does not know is being sought. Thus every *question* has *three elements*, to wit, *something unknown*, however perfectly, *something known*, however imperfectly, and *the relation between them*; and there are *two possible errors* with respect to this relation. *First*, one may assume more data and more determinate data than are given. *Second*, one can neglect some condition explicitly or implicitly required for the determination of a question. But there is a significant distinction between understanding and answering a question. There is also a big difference between understanding a question and recognizing its peculiar difficulty. So one is supposed to survey the data of a proposition, by rejecting what is superfluous, by retaining what is necessary, and by remitting what is

doubtful. *Therefore the question is whether it is possible to reduce all imperfectly understood questions to perfectly understood questions – and, if it is not, then what impact is this going to have on the prospects of the 'mathesis universalis' being sought?*

According to Rule 14, one should, in order that the intellect may grasp a question much more distinctly, reformulate it in terms of the real extension of bodies and present it to the imagination by means of bare figures. *The argument is that by representing certain questions pictorially to the imagination one can help the intellect to apprehend them better intuitively.* To begin with, *deducing* the unknown from the known means *discovering* some new entity or *uncovering* the participation of the sought in the given. All knowledge – except for that which is obtained through the simple intuition of a single thing – is gathered through *a comparison of two or more things*. In 'simple and straightforward' comparisons the given and the sought participate in a common nature *equally*; in all others they do so *proportionally*: the task is to derive an equality from the proportions. But only what admits of more and of less can be thus reduced, and this all falls under the rubric 'magnitude' or 'magnitudes in general', that is, magnitudes abstracted from all subject-matter. One has to note that there is a distinction between *magnitudes in general* and *species of magnitudes* as well as that what applies to the former also does to the latter. That species of magnitude which is most distinctly and easily imagined is *the real extension of a body, regarded only in so far as it is shaped*, since nowhere else are the differences of the proportions more distinctly exhibited or the equalities in the proportions more easily developed. A key remark seeks to set priorities: First, ordinary mathematics serves method; then, method and *mathesis universalis* support each other; finally, both method and *mathesis universalis* assist *sapientia universalis*. Meanwhile, 'extension' is defined, not as something other than the extended subject itself, but as all that which has *length*, *breadth*, and *depth*. There are also said to be *three different manners of speaking about extension*. *First*, to say that 'extension occupies a place' is to risk holding extension for something other than that which is extended. *Second*, to say that 'body possesses extension' is to risk thinking that extension contains something distinct from that which is extended. *Third*, to say that 'extension is not body' is to risk falling into the contradiction that the same thing is simultaneously body and not body. Only close cooperation between the intellect and the imagination can prevent these conceptual and linguistic confusions. The failure of the intellect to rely on the assistance of the imagination leads to *fallacies of misplaced abstractness* in arithmetic and in geometry. Now, regarding the extension itself of something extended, every question is supposed to have been reduced to such determinacy that one is to find *an unknown extension* from *a known extension* via a comparison both of the differences between and of the equalities in the proportions between all the relevant features of extension, namely, *dimension*, *unity*, and *shape*. 'Dimension' is defined as a mode with respect to which and as an aspect in accordance with which a subject is considered to be measurable, including not only *length*, *breadth*, and *depth*, but also *weight*, *speed*, and *an infinite number of others*; the very division of a whole into several equal parts is the dimension in terms of which the whole is measured or the parts are counted. There are an infinite number of different dimensions within the same subject, which, whether real or conceptual, have the same function. The line, the surface, and the solid are not three really distinct species of

geometrical quantity, and length, breadth, and depth are not three really distinct dimensions of body. 'Unity' is defined as the common nature in which all comparanda must equally participate, and *the unit* is *a magnitude* or *a common measure*. Of the many different kinds of figures, two, those by means of which the differences of relations or of proportions are best expressed, are used to display *sets* and *magnitudes*, the two kinds of comparanda. All relations between entities of the same kind are placed either under *order* or under *measure*. *In measuring* comparanda, one needs a *unit* as the common measure; *in ordering* them, one does *not*. But, looking at measures, one can use an assumed unit to reduce continuous magnitudes to a set of units, which can then be arranged in such an order that the knowledge of a measure ensues by means of an inspection of the order. In doing so, one should focus on *length* and on *breadth*, since no other dimensions of a continuous magnitude are conceived more distinctly. Thus *rectilinear and rectangular surfaces* or *straight lines* are described as the simplest figures for displaying continuous magnitudes or a set or a number. *Therefore the question is, not so much whether, but rather how as well as to what extent, one can, when engaged in solving mathematical problems, use the concrete evidence provided by the imagination to improve the abstract evidence achieved by the intellect.*

According to Rule 15, in most cases one should, in order more easily to hold one's thought attentive, draw the pertinent figures and display them to the senses. *The argument is that by representing certain questions figuratively to the senses one can help the intellect to apprehend them better intuitively.* There are said to be *three ways of depicting the unit*, namely, by means of a *square*, if it is regarded only as having length and breadth, or by means of a *line*, if it is regarded only as having length, or by means of a *point*, if it is regarded only as making up a set. *Therefore the question is how the intuitive representation of figures to the senses can best assist the intellect in the search for truth in mathematics.*

According to Rule 16, one should, in order to spare the memory, use concise symbols rather than complete figures to represent those things which, although they are necessary for the conclusion, do not require the present attention of the mind. *The argument is that by representing certain questions symbolically for the memory one can help the intellect to apprehend them better intuitively.* Because *memory* is often shaky, the art of *writing* must assist in the symbolic representation of those dimensions which must be taken into account but cannot be constantly retained. The magnitudes should be expressed by means of as concise and precise symbols as possible, so that a continuous movement of thought can intuit as many as swiftly and as simultaneously as possible. *First*, in order to distinguish best, one abstracts from both geometrical figures and arithmetical numbers in favor of the letters *a*, *b*, *c*, et cetera, for known magnitudes, and A, B, C, et cetera, for unknown magnitudes. *Second*, the root, the square, the cube, et cetera, are redefined in terms of relations as magnitudes in continued proportion preceded by the assumed unit. *Third*, it is noted that, because numbers can express both order and measure, it may happen that a difficulty can be resolved more simply in the given numbers than via abstraction of its terms from them. It is recommended generally that one not remember anything that one can record in writing, so as not to distract the natural intelligence from present concentration by superfluous recollection. These last four rules are also supposed to play a major role in the third part of the treatise. *Therefore the*

question is how the symbolic representation of figures for the memory can best assist the intellect in the search for truth in mathematics.

Section Two, consisting of Rules 17–21, shows how to handle determinate and perfectly understood difficulties in such a way that, however many unknown magnitudes occur in one proposition, all can be mutually subordinated in terms of proportional relations to a unit and in regard to a sum equal to some known magnitude.

According to Rule 17, one should run through the proposed difficulty directly, and one should do this by abstracting from the fact that some of its terms are known and others are unknown, and by intuiting, through sound discursive reasoning, the mutual dependence of individual terms. *The focus is on the distinction between the direct and the indirect deduction of propositions, and it is shifting from the former to the latter.* The key is to subordinate the many unknown magnitudes in a proposition mutually in terms of a unit, in order to get them to yield a sum equal to some known magnitude. The idea is that, since in the deductive resolution of a question the unknown terms are determined by the known terms, one supposes the former to be the latter, thus using both the direct or intuitive procedure and the indirect or deductive approach, so that the hard, for example, getting from 3 and 48 to 12, becomes the easy, for example, going from 3 and 6 to 12. *Therefore the question is whether and to what extent this is yet another attempt to show how direct, intuitive thinking supports indirect, deductive reasoning – the double-edged effect of which efforts has been quasi to undermine the autonomy of deduction.*

According to Rule 18, one should, for the present purposes, use only addition, subtraction, multiplication, and division – operations by means of which some magnitudes are deduced from others. *The focus is on the definition of algebraic operations and on their figurative representation by means of geometrical formations.* The starting-point is that 'operationes non sunt multiplicandae praeter necessitatem'. In operations in which sought magnitudes are contained in given magnitudes, one finds a magnitude by having the parts that compose it (*addition*) or by possessing the whole and the excess of the whole over the part (*subtraction*); in operations in which this is not the case, one pursues the relation between sought and given magnitudes directly (*multiplication*) or indirectly (*division*). The unit is the foundation of all relations, although the given and the sought magnitudes occupy different positions in each operation. Examples of multiplication are given. Examples of division are given. The stated goal is the explanation of the four operations via the representation of them to the imagination and to the senses. Now the algebraic operations are represented by means of geometrical figures. But there is no claim that this treatment is exhaustive. There is also the preparation of the terms of the other operations. And some figures can be transformed into others and vice versa. Finally, the striving for completeness leads to a need to explain that which needs no explanation. *Therefore the question concerns the architectonic argument of the treatise, and this indicates that the firmament over the work is about to crack.*

According to Rule 19, one should, by means of this method of reasoning, seek as many magnitudes expressed in two different ways as one supposes unknown terms as known for running through the difficulty directly, so that one thus obtains as many comparisons between two equal terms. The elucidation of this rule remains a desideratum.

According to Rule 20, one should, once the equations have been found, execute the operations multiplication and division, never using the former when the latter is appropriate. The elucidation of this rule also remains a desideratum.

According to Rule 21, one should, if there are many equations of the pertinent sort, reduce them to a single one, namely, to that equation whose terms occupy fewer places in the series of magnitudes in continued proportion, according to which series the terms are to be arranged in order. The elucidation of this rule remains yet another desideratum.

Section Three, consisting of Rules 22–24, is completely missing and thus it is hard to determine its specific structure or concrete content.

Part Three, which would have comprised Rules 25–36, would have treated of imperfectly understood questions. But this part lacks, once again, all its rules. Indeed, the attempt to reduce imperfectly understood questions to perfectly understood questions would no doubt have met with fierce resistance from the concrete, heterogeneous, material cores of at least some of the empirical-scientific problems at issue.

So could Descartes have ever achieved, in a single discipline, both the *consistency* of formal mathematics and the *completeness* of universal ontology? While he would have needed both the one and the other for a genuine *mathesis universalis*, there are no indications in the *Regulæ* that Descartes thinks that this discipline could encompass *everything without further ado*. After all, Descartes never denies that there are things which cannot be understood in terms of order and measure. Indeed, for all his irresistible attraction to the mathematical ideal of evidence and of certainty, Descartes does believe that there are things which, although they cannot be quantified, can be apprehended in the highest degrees of clarity and distinctness – or that what can be measured in quantitative units and what can be grasped in rigorous concepts do not coincide. Of course, none of this changes the fact that the *mathesis universalis* developed in the *Regulæ* does not even include all the things that can be apprehended in terms of order and measure. Thus the reader is looking at an unfinished project which, even if it had been completed, would still have been rather limited.

Yet, all things considered, and despite the fact that this project remains essentially a fragment, in the *Regulæ* Descartes still achieves an intensity of concentration on a single issue which is hardly superseded in any of his other works. It is the problem of *evidence*. For the main aim of this work is to develop a methodology for rendering evidence in general as present, as graphic, and as reliable as possible, that is, as present, as graphic, and as reliable as mathematical evidence in particular – thus, at least, the argument. Therein also lies a special connection between the given *methodus* and the sought *mathesis universalis*. Still, whereas mathematics emphasizes a superstructure of abstract, formal, and deductive reasoning, methodology stresses the corresponding infrastructure of concrete, material, and intuitive experience – as the teleology of the work right up to and beyond the final extant rules shows. Therefore *methodus* and *mathesis* are supposed both to learn from and to teach each other mutually in certain respects. In no case, in other words, would it be accurate to depict the Descartes of the *Regulæ* as unreflectively striving to recreate all science in the image and likeness of mathematics. Rather, Descartes wants to eat his cake and to have it too, that is, he argues for a method which

would enable *both* mathematics in particular *and* science in general to achieve *both* the immediately vivid evidence of intuition *and* the discursively rigorous evidence of deduction. Of course, there would also be corresponding implications for an accompanying conception of philosophy. At the same time, all this serves to allow the true red thread of the *Regulæ* to emerge in heightened relief, namely, the issue of which manner of evidencing is epistemically more basic – intuition or deduction.

Thus the fixed focus on evidence becomes most manifest in the tension, at least partially unresolved, between intuition and deduction, which are not, in the temporarily final analysis, two distinct and equally autonomous ways of knowing at all. Indeed, especially in philosophical discourse, both the Latin expression 'evidentia' and the English word 'evidence' are characterized by an essential equivocity. For, on the one hand, they relate to the direct, immediate, and intuitive insight into the truth of something, usually ideas; on the other hand, they refer to the indirect, mediated, and discursive procedure through which is procured insight into the truth of something, usually propositions. Some contemporary discussions of knowledge in the English language do not differentiate well enough to do justice to this distinction, to the point where it has become generally acceptable to speak of 'justification' (connotation: discursive) when 'evidence' (connotation: intuitive) would be more accurate. To be sure, evidence in the intuitive sense and evidence in the discursive sense can cooperate and thus contribute to knowledge of one and the same thing; none the less, this is no reason not to distinguish between them. Well aware of the linguistic and philosophical difficulties involved, Descartes distinguishes keenly and eventually concludes that, epistemically speaking, intuition is unequivocally more basic than deduction. For, once again, each operation has its own proper evidence. But the decisive consideration is that the certainty of intuition is understood as springing from a relationship of immediate presence between the knower and the known which is simply impossible to achieve by means of any significantly discursive deduction.

Here it is noteworthy that both the English expression 'evidence' and the Latin word 'evidentia' appear to derive etymologically from the Latin preposition 'ex', signifying 'from out of', as well as from the passive infinitive form of the verb 'videre', that is, 'videri', meaning 'to be seen' or 'to show (itself)': In the radical sense, then, what is 'evident' is that which shows itself from out of itself, and evidence is the showing of itself of that which shows itself from out of itself.[171] Thus evidence is, primarily and ultimately, not a thing, but rather a process. Also, the motion involved in evidence is that *from* that which is evident *to* the one to whom it is evident. Therefore, to the extent that the process of evidence is not itself immediate, it requires exactly what Descartes argues, that is, an accompanying continuous and uninterrupted movement of thought on the part of the one to whom or for whom that which is evidencing itself is supposed to become evident. In this respect, deduction necessarily remains inferior to

[171] Cf. *The Oxford English Dictionary, Second Edition* (Oxford, 1989), vol. V, pp. 469–470. Note well the difference between the verbal or dynamic and the substantive or static aspects of 'evidence', for it is even possible to use the English word as a verb, that is, 'to evidence'. Late Latin also had the passive form *evideri* in the sense of 'to be evident'.

intuition, since the former involves a lower degree or grade or level of evidence and depends on the latter – as well as on induction – for supplementation.[172]

Therefore it also comes as no great surprise that the primary and ultimate concern of the *Regulæ* is to recommend how to make the most of one's native intelligence. As Descartes employs the term in the text, 'ingenium' conveys two basic ideas, namely, that of *intelligence* and that of the fundamentally *natural* character of the same. Taken together, these notions yield *innate genius*, understood as the cognitive power of the *whole* human being in *all* its manifestations. To be sure, there is no real English equivalent for the Latin, since 'genius', in the sense of a natural *intellectual* talent, is as close as it gets, and that is not nearly close enough, while 'ingenuity' is related, but utterly misleading. None the less, some of the derivative forms of the Indo-European root 'gen(e)-' do begin to express some of the intimately associated significations: kin, king, kind, gentle, general, generate, genius, engine, genuine, germ, genital, pregnant, nation, native, and nature.[173] Indeed, it is usually fairly difficult and sometimes almost impossible to decide whether to understand 'ingenium' in the 'facultative' sense of '*the* natural intelligence' or in a 'functional' sense as simply 'natural *intelligence*'. In any case, in establishing the significance of the term 'ingenium' for the *Regulæ*, it is worth bearing in mind that Descartes asserts that it is often necessary to ascribe unconventional meanings to traditional expressions in order to make oneself understood.[174]

Perhaps the easiest way to motivate potential readers' interest in Descartes' conception of 'intelligence' in the *Regulæ* is to point out how 'relevant' this text is to three – bracketing out the question of the relationship between natural intelligence and artificial intelligence[175] – contemporary debates about intelligence and its various aspects. In any case, to translate the title of the work as has been done here is inevitably to awaken certain associations of ideas that simply cannot be left unclarified.

First, there is the debate about what exactly *intelligence* is: On the one hand, there is the view that 'intelligence' consists of one identical factor. For example, Spearman, the father of modern psychometrics, posits an entity 'g', underlying and explaining all forms and expressions of intelligence, which has become known as 'Spearman's *g*', where '*g*' stands for *general intelligence*.[176] On the other hand, there is the view that 'intelligence' comprises many different factors. For example, Gardner, a leading cognitive psychologist, argues for '*multiple* intelligences'.[177] There is also Guilford's position

[172] This paragraph also shows why one must be very careful when using evidence in the legal sense, i.e., that which indicates the existence or non-existence of an alleged state of affairs or the truth or falsity of a statement given in testimony, to elucidate evidence in the properly epistemological sense. For evidence in the legal sense, which is 'evidence *for* or *against*', is not foundational, but rather derivative.

[173] Cf., e.g., 'Index of Indo-European Roots', *The American Heritage Dictionary of the English Language*, p. 2103, and *Historisches Wörterbuch der Philosophie*, vol. 4 (Darmstadt, 1976), cols. 360–363.

[174] Cf., e.g., R. 3, § 6.

[175] Cf., e.g., Roger Penrose, *The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics* (Oxford, 1989), Daniel Dennett, *Consciousness Explained* (New York/London, 1991), and Roger Penrose, *Shadows of the Mind: A Search for the Missing Science of Consciousness* (Oxford, 1994).

[176] Cf., e.g., Charles Spearman (1863–1945), 'General Intelligence, Objectively Determined and Measured', *American Journal of Psychology*, vol. 15 (1904), pp. 201–293.

[177] Cf., e.g., Howard Gardner, *Frames of Mind: The Theory of Multiple Intelligences* (New York, 1983).

of virtually innumerable particular mental abilities constituting intelligence.[178] It is difficult to say on which side Descartes would have stood in this debate, for his fundamental ambivalence regarding the nature of intelligence becomes most evident in the *Regulæ* through his attempt to give an account of the distinctions between the different manners of manifestation of the natural intelligence in both 'facultative' and 'functional' terms.[179] In other words, it is easy to see that in the *Regulæ* Descartes grasps 'ingenium' both as a faculty and as a function, whereas it is hard to discern which perspective is dominant. Perhaps the issue is undecidable on a general plane because it is primarily and ultimately a matter of the particular context involved.

Second, there is the debate about whether intelligence is a narrow, 'intellectual' phenomenon pertaining to the mind alone or a wider, 'moral' one involving the character of the whole person. Hand in hand with this, there is also a growing body of literature emphasizing the importance of traditionally neglected 'emotional intelligence' vis-à-vis traditionally emphasized 'cognitive intelligence'.[180] This discussion is, in a sense, a contemporary way of reposing the ancient Greeks' question about the relationship between knowledge and virtue.[181] For Socrates claimed that 'virtue is knowledge'[182] and no one really understood what he was trying to say until Aristotle delivered a profound interpretation of his statement, namely, that ethical virtue without dianoetical virtue is blind and dianoetical virtue without ethical virtue is empty.[183] To understand this felicitous elucidation of Socrates' thesis as an attempt at a refutation is to misunderstand both the original and the commentary.[184] While there may be something to the critique that Descartes' account of knowledge could and should be less heavily oriented on the intellectual faculties, abilities, and activities, one must also acknowledge that he does emphasize, for example, the role of the will in judgment, in truth, and in error much more than he has been given credit for. A classic case study is the – not only brilliantly subtle but also rather neglected – analysis of the intellectual and volitional aspects of judgment in the *Meditations*.[185]

Third, there is the debate about heredity and environment in regard to intelligence. Now the chief controversy concerning intelligence happens to center around how much each of these factors, in other words, 'nature' and 'nurture', is responsible for the

[178] Cf., e.g., J. P. Guilford, 'The Structure of Intellect', *Psychological Bulletin*, vol. 53 (1956), pp. 267–293; 'Three Faces of Intellect', *American Psychology*, vol. 14 (1959), pp. 469–479; etc.

[179] Cf. esp. R. 12, § 10.

[180] Cf., e.g., Antonio R. Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (New York, 1994), and Daniel Goleman, *Emotional Intelligence: Why It Can Matter More Than IQ* (New York, 1995).

[181] But only 'in a sense'. Actually, there are two distinct but inseparable issues here, i.e., the relationship between different kinds of intelligence and the relationship between different kinds of virtue. But the relationships sometimes criss-cross, as in Robert Coles, 'The Disparity Between Intellect and Character', *The Chronicle of Higher Education*, vol. XLII, no. 4 (Sept. 22, 1995), p. A68.

[182] Cf., e.g., Plato, *Protagoras*, almost passim.

[183] Cf. Aristotle, *Nicomachean Ethics*, bk. VI, passim.

[184] Two popular films of 1994, 'Forrest Gump' and 'Quiz Show', taken together, make the same point as Aristotle does. For it seems that Forrest Gump succeeds in life by being dense but decent, whereas Charles van Doren fails by being clever but corrupt. On the other hand, this is a superficial character analysis, for neither protagonist possesses what Aristotle would have regarded as complete virtue.

[185] Cf. esp. Meditation IV, passim.

level of intelligence that particular individuals or specific groups possess – the assumption being that both the percentage of factor and the level of intelligence are measurable, that is, quantifiable. Yet some of the often overlooked redeeming social value of Cartesian dualism lies precisely in the fact that, while Descartes does seem to get rather fixated on quantifying matter, he never appears to be very interested in measuring mind. And, as the full title of the *Rules for the Direction of the Natural Intelligence* indicates, Descartes would regard the proper employment of the intelligence as a matter both of heredity (or of the natural: from birth) and of environment (or of the habitual: from rules). In any case, the project of the *Regulæ* is to show how art – in the form of method – can improve upon nature (or how nurture can improve nature).[186] Therefore Descartes can hardly be counted among those who would seek to know for whom – but also against whom – the bell curves.[187]

Thus both Descartes' philosophy of rationality in general and his methodology in particular focus, not on measuring levels or grades or degrees of intelligence, but on improving the application of the natural intelligence. The classic statement of this position is found in the opening parts of the *Discourse*.[188] In other words, it is not enough for the human being to be a rational being; the human being must also be able to reason well. And the *Regulæ* represent Descartes' most extensive and profound set of reflections on how to exercise human rationality properly by reasoning well.

Philology: Manuscripts, Editions, Translations of the 'Regulæ'

The point of departure for the present edition has been that version of the *Regulæ ad directionem ingenii* which has appeared in volume X (1908) of the standard edition of the works of Descartes. The new, revised edition of the original series, first published at the turn of the century (Paris: Léopold Cerf, 1897–1913), is: *Œuvres de Descartes* (vols. I–XIII), edited by Charles Adam and Paul Tannery (Paris: Librairie Philosophique J. Vrin and Le Centre National de la Recherche Scientifique, 1964–1976).[189] This edition has often been reprinted.

The authenticity of the *Regulæ* is beyond question. They are explicitly mentioned for the first time in the inventory of Descartes' 'writings on the sciences' which was compiled in Stockholm on February 14, 1650, three days after his death there.[190] This list, two manuscript copies of which survive,[191] refers to the *Regulæ* under the rubric:

[186] Cf., e.g., R. 9, § 4.

[187] Cf. Richard J. Herrnstein and Charles Murray, *The Bell Curve: Intelligence and Class Structure in American Life* (New York, 1994).

[188] Cf. esp. AT, VI, 1–22. Of course, Descartes does believe that there can be considerable differences among the intellectual capacities of human beings. On the one hand, when he is emphasizing such differences, he tends to use the word 'esprit' (mind): Cf. AT, VI, 2–3, 5, 7–8, 10, 15–19, 21–22, 24–25, 27–28, 30, 32, 37–38, 54–55, 58–59, 61–62, 64, 69–71, 74, and 76. On the other hand, when he is emphasizing commonality among human beings in this respect, he is liable to use the word 'sens' (sense): Cf. AT, VI, 1–2, 10, 13, 24, 61, and 77.

[189] By the way, in the dating of the *Regulæ* Adam appears to be following Millet. Cf. AT, X, 486–488 ('… la date approximative de 1628 …'; '… la date de 1628 environ …'; etc.).

[190] See Baillet, *La Vie de Monsieur Des-Cartes*, vol. II, pp. 427–428.

[191] See AT, X, 1–14. One is in the National Library of Paris and the other is in the Library of the University of Leiden.

'Nine notebooks, bound together, containing part of a Treatise on Useful and Clear Rules for the Direction of the Mind in the Search for the Truth.'[192] In addition, Pierre Borel (fl. 1651) provides, in one of the earliest biographies of Descartes, a Latin translation of this inventory, where one finds the following item: 'Nine codices on useful and clear Rules for the direction of the natural intelligence in the search for the truth.'[193]

The French ambassador to Sweden, Hector-Pierre Chanut (1601–1662), who had served as an intermediary between Descartes and Queen Christina of Sweden (1626–1689) and with whose family Descartes had resided during the philosopher's own stay in Stockholm (October, 1649–February, 1650), brought the original manuscript of the *Regulæ*, together with Descartes' other manuscripts, back to the Netherlands, where most of them had been composed, when he became ambassador there (1653). Yet nothing came of Chanut's plans to edit and to publish the manuscripts.

Except for some manuscripts that still remained for a time with the ambassador,[194] the others were now sent to Paris and owned by his brother-in-law, Claude de Clerselier (1614–1684),[195] through whom Chanut and Descartes had first become acquainted. It was then Clerselier, a French government official and one of Descartes' original and strongest supporters in France, who assumed the responsibility for an edition.[196] Indeed, Clerselier would establish himself as Descartes' publicist, for he had perhaps been responsible for the publication of Descartes' treatise *The Passions of the Soul* (1649), and he would certainly be responsible for an edition of the philosopher's *Treatise on Man* (1664) and of his *Treatise on the World* (1677). Yet Clerselier was soon overwhelmed with work on Descartes' literary legacy and would not be able to publish the *Regulæ*.[197]

After Clerselier's death the paper trails off, with respect to both the manuscripts in general and the *Regulæ* in particular.[198] They were passed on to the Abbé Jean-Baptiste Legrand, whose ambition was a complete edition of Descartes' works, including the posthumous ones. But Legrand died in 1704 before the completion of the edition, and the task was then left to the philosophy professor Marmion. Yet he too died in 1705, and the papers eventually landed with Legrand's mother. Now no one really knows what became of the manuscripts after these lesser known figures got hold of them. Thus the original manuscripts that were handed over by Chanut to Clerselier, including the original Latin manuscript of the *Regulæ*, are now presumed to be irretrievably lost.[199]

[192] The list comprises 23 articles, marked alphabetically, with the *Regulæ* mentioned at 'F': 'Neuf cahiers, reliez ensemble, contenant partie d'un Traité des Règles utiles & claires pour la direction de l'esprit en la recherche de la vérité.' See AT, X, 351.

[193] See *Vitae Renati Cartesii summi philosophi compendium* (Paris, 1656), p. 18, and AT, X, 351: 'Codices noveni de Regulis utilibus & claris ad ingenii directionem in veritatis inquisitione.'

[194] Cf. AT, X, 13–14.

[195] Cf. ibid., p. 13.

[196] Cf. AT, V, 615–618.

[197] Clerselier also published three volumes of Descartes' correspondence (1657, 1659, and 1666). In the preface to the last volume he complains about his lack of leisure and appeals for help in editing and in publishing the manuscripts and fragments in more volumes – but in vain.

[198] Cf. AT, X, 1–14.

[199] Cf. AT, I, XLVI–XLVII and XLIX; X, 353; etc.

On the other hand, a number of scholars did have direct contact with the original manuscript of the *Regulæ*. For example, in the second edition of the '*Logic of Port-Royal*' (1664)[200] the philosophical logicians Antoine Arnauld (1612–1694) and Pierre Nicole (1625–1695) employed an extensive extract, translated into French, from Rules XIII and XIV of the *Regulæ* – indicating that Clerselier had provided the manuscript. Also, in his *Remarques sur la méthode de Descartes* (1670) Nicolas Poisson displays knowledge of, by acquaintance with, the manuscript – once again via Clerselier.[201] Next, it is possible that Clerselier showed the manuscript to the Cartesian philosopher Nicolas de Malebranche (1638–1715), who in 1674/1675 published a work with a title strikingly similar to the French designation of the manuscript of the *Regulæ*, namely, *On the Search for the Truth, Wherein One Treats of the Nature of the Human Mind and of the Usage that One Should Make of It in order to Avoid Error in the Sciences*.[202] Finally, in his *La Vie de Monsieur Des-Cartes* (1691) Descartes' leading biographer Adrien Baillet (1649–1706), recognizing and appreciating the philosophical significance of the *Regulæ*, refers liberally to the manuscript – saying that Legrand made it available to him.[203]

A special case is that of the relationship between the manuscript of the *Regulæ* and the philosopher Gottfried Wilhelm Leibniz (1646–1716). For toward the end of his stay in Paris (1672–1676) he and an associate, the mathematician, physicist, and philosopher Ehrenfried Walter von Tschirnhaus (1651–1708), paid a visit to Clerselier in the course of which they viewed various unedited manuscripts of Descartes.[204] According to a hand-written note of Leibniz, one of the things that he saw on this occasion was a manuscript containing 'a discourse of Mr. Descartes [entitled] "*On the Search for the Truth*" ' in which 'there were about 22 rules explained and illustrated – in Latin'.[205] Keenly interested in what they were seeing, the visitors had originals transcribed, and copies were later sent to acquaintances of Tschirnhaus in Holland as well as to Leibniz in Hanover. Thus it is conceivable, but not established, that the manuscript of the *Regulæ* was among those that were copied and 'distributed' in this way.[206]

In any case, Leibniz did soon obtain a copy of the *Regulæ*. For, although the exact date of acquisition is controversial,[207] he seems to have purchased – probably in 1678 –

[200] Of which see more below.

[201] See Nicolas-Joseph Poisson, *Commentaire ou remarques sur la méthode de René Descartes* (Vendôme, 1670), p. 76, and Baillet, *La Vie de Monsieur Des-Cartes*, vol. I, pp. XII–XIII.

[202] Cf. *De la recherche de la vérité, où l'on traitte de la nature de l'esprit de l'homme, et de l'usage qu'il en doit faire pour éviter l'erreur dans les sciences* (Paris, 1674/1675 [vols. I–II] and 1678 [vol. III]).

[203] Cf. AT, I, XLVII. Baillet refers to the *Regulæ* at the following places: vol. I, pp. 111–115 and 281–283, and vol. II, pp. 403–406, 471, 476–479, 481–483, and 486–487. He expressly cites the *Regulæ* at the following places: vol. I, pp. 112 and 282, and vol. II, pp. 477–479, 481, and 483. Cf., e.g., vol. I, p. 282: 'C'est un manuscrit latin, non achevé, qui est entre nos mains.' This marginal note refers to '*ses* [Descartes'] *Règles pour la direction de l'esprit dans la recherche de la vérité*'.

[204] See AT, X, 208–209, and XI, 661–662.

[205] See AT, X, 208 (sic): 'Il [Clerselier] nous [Leibniz and Tschirnhaus] montra un discours de Mons. des Cartes *de la recherche de la verité*; il y avoit environ 22 regles expliquées & illustrées. En latin.'

[206] Cf. Giovanni Crapulli, *Regulæ ad directionem ingenii: Texte critique établi … avec la version hollandaise du XVIIème siècle* (The Hague, 1965/1966), pp. XXII–XXIV.

[207] Scholars have given at least three different dates for Leibniz's acquisition of a copy of the *Regulæ*: (1) Adam assumes that it was September, 1670 (AT, X, 354). (2) Crapulli suggests that it was November, 1676 (*Regulæ: Texte critique*, pp. XIII and XVII–XVIII). (3) Springmeyer proposes that it was between May and September, 1678 (*Regulæ / Regeln*, p. XV).

a copy from Dr. Schuller in Amsterdam, Schuller being a member of a Spinozistic circle with ties to Tschirnhaus.[208] It would then be discovered much later by the scholar Foucher de Careil[209] among Leibniz's papers in the Royal Public Library in Hanover, where it is still to be found.[210] Thus in the apparatus criticus to the edition of Adam and Tannery the convention was established that the version provided by this manuscript be referred to as 'H'. But Leibniz's version is an inferior one, containing lacunae and errors, so that he was forced to emend the text.[211] Therefore, in order to distinguish between Leibniz's copy as he found it and Leibniz's copy as he left it, Crapulli – responsible for the critical edition of the *Regulæ* – refers to the textual emendations as 'L'.[212]

But – at least – two early copies of the *Regulæ* appear to have been made in Holland. For another copy, an apparently much better one, belonged, probably, to Johannes de Raey (or 'Raei') (1622–1701), a Dutch Cartesian active in Leiden.[213] Although this copy – like the original – is now presumed to be lost, some suppose that it was used for both the Dutch translation of 1684 and the first edition of the original Latin of 1701.[214]

Not at all oddly, the *Regulæ* were first published, neither in Latin nor in French, but rather in a Dutch translation entitled '*Regulen van de bestieringe des verstants*' (Amsterdam: Jan Rieuwertsz., 1684).[215] If de Raey's copy did serve as the basis for this edition, then the copy must have been available by around 1680. For the translator, Jan Hendriksz. Glazemaker (b. 1620) – an artisan occupied with the production of glass about whose intellectual biography little is known except that he too was a member of a Spinozistic circle in contact with Tschirnhaus –, died (1682) before the publication of the translation. The version presented by the Dutch edition is customarily referred to as 'N', since what is at issue is 'la version hollandaise', 'H' is already taken, and 'néerlandais(e)' is French for 'Dutch'. Still, what is telling is sometimes not so much the text of 'N' itself as the text(s) of the (missing) Latin manuscript(s) underlying it.[216]

The 'editio princeps' of the *Regulæ* was published as '*Regulæ ad directionem ingenii*' in Descartes' *Opuscula posthuma, physica et mathematica* (Amsterdam: P. and J. Blaeu, 1701).[217] But this first printed edition of the *Regulæ* in Latin also contains a number of flaws and errors.[218] In the edition of Adam and Tannery the version offered by this edition is referred to as 'A'. Once again, one cannot assume without further ado that the

[208] See AT, X, 354–356. Cf. the letter from Tschirnhaus to Leibniz from the end of 1678 in: *G. W. Leibniz: Philosophischer Briefwechsel*, ed. Preußische Akademie der Wissenschaften (Berlin, 1926), vol. I, p. 429, no. 190.

[209] Cf. Louis Alexandre Comte Foucher de Careil (ed.), *Œuvres inédites de Descartes, Précédées d'une introduction sur la méthode* (Paris, 1859–1860), vol. I, p. v.

[210] See Leibniz's hand-written note: 'Ein latein Mstum de M. Des Cartes, dessen Titel: *Methodus inquirendae veritatis*' (AT, X, 354).

[211] See, e.g., Crapulli, *Regulæ: Texte critique*, pp. XVI ff. and XXV ff.

[212] See ibid., pp. XXV ff. and XXXVII.

[213] See ibid., p. XXI ff.

[214] See AT, X, 353, and cf. Crapulli, *Regulæ: Texte critique*, pp. XXII–XXIV.

[215] See Crapulli, *Regulæ: Texte critique*, p. 1* ff.

[216] See ibid., pp. XIV ff. and XXI ff.

[217] See AT, X, 356–357.

[218] See Crapulli, *Regulæ: Texte critique*, p. XIV ff.

text of the printed version, the editorial roots of which would also appear to lie rather in Holland than in France,[219] is identical in all respects to the text(s) of its (missing) original manuscript(s).[220]

Now the scholarly dissensus appears to be that, while it is possible that Leibniz's copy ('H') derives directly from Descartes' original,[221] the same does not hold for Glazemaker's translation ('N') or for Blaeu's edition ('A'), both of which are derived from a copy or from copies in between.[222] In fact, Crapulli goes so far as to assert that there is no immediate relationship between any of 'H' or 'N' or 'A' and the original manuscript of Descartes' *Regulæ*.[223]

To summarize, in other words, one only has to keep in mind the following significant stations along the early path of the *Regulæ*:

	Date:	*Textual Development:*	*Existential Status:*
1	1628	Completion of Original	'O' – Lost
2	1678	Acquisition of 'H'	'H' – Preserved
3	1678 ff.	Emendation of 'H' into 'L'	'L' – Preserved
4	1680 (?)	Availability of de Raey's copy	'R' – Lost
5	1684	Publication of 'N'	'N' – Preserved
6	1701	Publication of 'A'	'A' – Preserved

Due to the lack of a genuine original, that is, the enterprise of establishing the text of the *Regulæ* is like comparing several different editions of several different morning newspapers with one another in order to find out which one is – or which ones are – accurate. It is a continuing process of definition with no real hope for definitiveness in any strict sense. For there are two Latin 'prime copies', to wit, 'H' and 'A'. On the one hand, 'H' contains numerous lacunae which 'A' does not. On the other hand, there are also numerous loci where it makes more sense to follow 'H' than 'A'. Therefore, as far as the Latin text of the present edition is concerned, no systematic attempt has been made to determine 'in principle' which manuscript 'in general' is better. Rather, the procedure has simply been to try to decide – on a case-by-case basis – which text fits more appropriately into which context. Thus the editorial choices have usually been based, not on correspondence, but on coherence. Such is the texture of this text.

[219] See ibid., p. XXIV: '*L'editio princeps* de 1701 doit donc se reporter à la tradition textuelle déjà établie en Hollande.'

[220] See ibid., pp. XIV ff. and XXI ff.

[221] Crapulli posits an intermediate copy between 'H' and the original (*Regulæ: Texte critique*, pp. XVI–XXI), whereas Springmeyer questions this position (*Regulæ / Regeln*, p. XII ff.). The point is that Leibniz's hand-written note concerning the validity of his copy is far from dispositive (sic): 'Diese Msta [including the *Regulæ*] sind noch nicht gedruckt, sondern ganz rar und sind von des Autoris eigener Hande abgeschrieben' (AT, X, 354). But does this necessarily mean that Leibniz's copy is directly derived from Descartes' original? Thus Crapulli's question itself begs the question (*Regulæ: Texte critique*, p. XXV): 'Comment Leibniz a-t-il pu prendre ce ms. comme étant de la main de Descartes?'

[222] Cf. AT, X, 353 and 356; Crapulli, *Regulæ: Texte critique*, p. XXI ff.; and Springmeyer, *Regulæ / Regeln*, p. XII ff.

[223] See Crapulli, *Regulæ: Texte critique*, p. XXII: 'Il est donc question de trois mss.; mais aucun d'entre eux ne dépend directement de l'original.' Cf. ibid., pp. XXXII–XXXIII.

For purposes of comparison, there are also a few twentieth-century standard editions of the *Regulæ*, namely (in chronological order):[224]

1 *Regulæ ad directionem ingenii*, in: *Œuvres de Descartes*, vol. X, pp. 359–469, edited by Charles Adam and Paul Tannery (Paris: Librairie Philosophique J. Vrin and Le Centre National de la Recherche Scientifique, 1908 ff.). This traditional Latin version, referred to as 'AT', is based on 'A' but occasionally checked and balanced by 'H'. For a variety of reasons Adam regarded 'A' as 'bien préférable' to 'H'.[225] The edition of Adam and Tannery represents a pioneering effort that contains mistakes, and it has been superseded by that of Crapulli. For example, Adam already knew of 'N',[226] but he thought that 'sans doute' the same copy had served as its basis as would later do so for 'A'.[227] But, as Crapulli's bilingual edition – with its juxtaposition of the Latin original and of the Dutch translation – indicates, this may not have been the case after all.

2 *Regulæ ad directionem ingenii: Texte critique établi … avec la version hollandaise du XVIIème siècle*, in: Archives internationales d'histoire des idées / International Archives of the History of Ideas, vol. 12, by Giovanni Crapulli (The Hague: Martinus Nijhoff, 1965/1966). This comprehensive bilingual Latin-Dutch version, referred to as 'C', is based on 'H', 'L', 'N', 'A', and 'AT'.[228] It is arguably the only genuinely critical edition, and, in any case, it remains the most philologically justified one.[229] The decisive difference between this edition and that of Adam and Tannery is that Adam, who was responsible for the latter, neglected 'N'.[230] Also, Crapulli prefers 'H' over 'A' in many more cases than did Adam. Remarkably, beyond recognizing that Descartes did make use of preexistent fragments and notes when bestowing a de facto final form on the text, Crapulli is extraordinarily careful not to get involved in the inextricable issues surrounding the irretrievably sedimented origins of the *Regulæ*.[231]

3 *Regulæ ad directionem ingenii / Regeln zur Ausrichtung der Erkenntniskraft: Kritisch revidiert, übersetzt und herausgegeben*, in: Philosophische Bibliothek, vol. 262 a, by Heinrich Springmeyer, Lüder Gäbe, and Hans Günter Zekl (Hamburg: Felix Meiner, 1973). This careful bilingual Latin-German version, referred to as 'SGZ', is based on 'H', 'L', 'N', 'A', 'AT', and 'C' – with a strong preference for following 'H' over both 'N' and 'A' as far as possible. For the basic intuition of this edition is that 'H' is closer to Descartes' original because it has been subjected to less editorial revision than has 'N' or 'A'.[232] In fact, this even leads to an ironic situation in which the unreliability of 'H' is adduced as evidence for its reliability.'[233] Still, 'SGZ' is the most balanced edition available, providing both a historical-philosophical introduction and many sharply-focused notes, especially in the form of textual cross-references.[234]

To summarize, in other words, one merely has to keep straight the following editions with their generally distinctive features:

	Date:	*Edition:*	*Distinctive Features:*
1	1908	'AT'	Prefers 'A' over 'H' and ignores 'N'.
2	1965/1966	'C'	Balances 'A' with 'H' and presents 'N'.
3	1973	'SGZ'	Considers 'A' and 'N' and prefers 'H'.

As far as the Latin text of the present edition is concerned, once again, no systematic attempt has been made to determine 'in principle' which edition 'in general' is better. Rather, the procedure has been to try to decide – in particular – what works better when, where, and why. But obvious misspellings,[235] simple transpositions,[236] and orthographic peculiarities[237] have not usually been recorded. If there has been a principle for the selection of textual variants, then the principle has been that, since this is to be a *philosophical* edition of the *Regulæ*, no variant that would make a specifically philosophical difference in understanding should be neglected.

To this end, there are a number of philosophically helpful editions and translations of the *Regulæ*, namely (also in chronological order):

1 *Rules for the Direction of the Mind*, translated by G. R. T. Ross, in: *The Philosophical Works of Descartes*, translated by Elizabeth S. Haldane and G. R. T. Ross (Cambridge: Cambridge University Press, 1911 ff.), vol. I, pp. 1–77. This edition offers a short preface, a few footnotes, and a translation that is still of more than merely historical interest.

2 *Regulæ ad directionem ingenii: Texte de l'édition Adam et Tannery avec une notice*, edited by Henri Gouhier (Paris: Librairie Philosophique J. Vrin, 1930/1946/1959). This edition, which would become Vrin's companion to Sirven's (see below), presents an improved version of the Latin text of 'AT' only, with a valuable introduction.

3 *Regulæ ad directionem ingenii / Règles pour la direction de l'esprit*, edited and translated by Georges Le Roy (Paris: Boivin, 1933). This is a bilingual Latin-French edition based on 'H' and 'A'.

[223] Between the Blaeu edition of 1701 and the Adam and Tannery edition of 1908 French scholars produced the following: (1) Victor Cousin (trans.), *Règles pour la direction de l'esprit*, *Œuvres de Descartes*, ed. Victor Cousin, vol. 11 (Paris, 1826), pp. 199–329; (2) Adolphe Garnier (ed.), *Regulæ ad directionem ingenii*, *Œuvres philosophiques de Descartes*, vol. 3 (Paris, 1835), pp. 55–137; and (3) L. Aimé-Martin (ed.), *Règles pour la direction de l'esprit*, *Œuvres philosophiques de Descartes* (Paris, 1838), pp. 475–510. All use the Amsterdam edition as the sole source, but Cousin and Garnier correct it in some instances. In addition, there was an edition by a German scholar: Artur Buchenau (ed.), *René Descartes' 'Regulæ ad directionem ingenii'* (Leipzig, 1907). Although Buchenau does not say that he examined 'H', his corrections of 'A' are consistent with it.

[224] See AT, X, 357.

[225] See ibid., p. 351 ff.

[226] See ibid., p. 353.

[227] See Crapulli, *Regulæ: Texte critique*, p. XX ff.

[228] Cf., e.g., ibid., pp. XIV–XVI ('N' and 'A') and XVI–XX ('H' ['L'] and 'AT').

[229] See ibid., p. XIX.

[230] See ibid., p. XXI: 'Descartes a-t-il rédigé plusieurs fois le traité des *Regulæ*? Ni l'examen des variantes, ni la forme du traité ne permettent de répondre affirmativement à cette question. Les variantes en effet peuvent toutes s'expliquer par des phénomènes ordinaires de transcription ou d'adaptation dans le cas de passages défectueux ou douteux. D'autre part la nature "syllogique" du traité exclut, autant que son inachèvement, l'hypothèse d'une autre rédaction: l'auteur en effet semble avoir utilisé des fragments et des notes d'époques antérieures sans aboutir à une élaboration accomplie et unitaire.'

[231] See Springmeyer's 'maxim' on p. XVI: '… so wird man sich bei der Herstellung des Textes, welcher dem ursprünglichen Wortlaut bei Descartes in dessen letzter Fassung möglichst nahekommen soll, zur Maxime machen können, H überall dort den Vorzug vor NA zu geben, wo sachlich nichts dagegen eingewandt werden kann.'

[232] Cf. Springmeyer, *Regulæ / Regeln*, p. XI ff., and Crapulli, *Regulæ: Texte critique*, p. XXV ff.

[233] Cf. also Heinrich Springmeyer, 'Eine neue kritische Textausgabe der *Regulæ ad directionem ingenii* von René Descartes', *Zeitschrift für philosophische Forschung*, vol. 24 (1970), pp. 101–125.

[234] E.g., 'SGZ', which is founded on 'C', which is grounded in 'AT', which is based on 'A' and on 'H', still contains an irritatingly regular lapsus in the form of an 'ingenium' (p. 54, l. 117, w. 2).

[235] E.g., in R. 10, § 2 (AT, X, p. 404, l. 10, ws. 3–4), 'C' reads 'ordo magis', whereas 'A' and 'AT' read 'magis ordo'.

[236] E.g., 'SGZ' prefers 'eandem', 'quandam', 'littera', etc., whereas 'C' prefers 'eamdem', 'quamdam', 'litera', etc. In matters morphological the Latin text of the present edition follows the aforementioned Georges' *Ausführliches Lateinisch-Deutsches Handwörterbuch* as well as Charlton T. Lewis and Charles Short, *A Latin Dictionary* (Oxford, 1879/1956).

4 *Règles pour la direction de l'esprit*, translated by Georges Le Roy, in: *Descartes: Œuvres et Lettres* (Bibliothèque de la Pléiade), edited by André Bridoux, pp. 37–119 (Paris: Éditions Gallimard, 1937/1953). This is a French translation with hardly any contextualization and no notes.

5 *Règles pour la direction de l'esprit*, translated by J. Sirven (Paris: Librairie Philosophique J. Vrin, 1945/1950/1959). This edition, Vrin's companion to Gouhier's (see above), is an accurate French translation only, with notes by a leading expert on Descartes' intellectual development up until just about that time at which he broke off the work on the *Regulæ*.

6 *Rules for the Direction of the Mind*, in: The Library of Liberal Arts, vol. 129, edited and translated by Laurence J. Lafleur (Indianapolis: Bobbs-Merrill, 1961). This edition contains a reliable English translation with modest contextualization by way of an introduction and some notes.

7 *Règles pour la direction de l'esprit*, translated by Jacques Brunschwig, in: *Descartes: Œuvres philosophiques*, edited by Ferdinand Alquié, vol. I: *1618–1637*, pp. 77–204 (Paris: Classiques Garnier, 1963/1988). This edition offers a French translation based on 'AT' as well as a contextualization thereof by means of many very well-placed notes.

8 *Règles utiles et claires pour la direction de l'esprit en la recherche de la vérité: Traduction selon le lexique cartésien, et annotation conceptuelle, avec des notes mathématiques de Pierre Costabel*, in: Archives internationales d'histoire des idées / International Archives of the History of Ideas, vol. 88, edited and translated by Jean-Luc Marion (The Hague: Martinus Nijhoff, 1977). This edition has only one major flaw, to wit, it lacks a version of the Latin original. Otherwise, it is by far the most philosophical edition of the *Regulæ* presently available, containing in-depth and wide-ranging 'annotations' (pp. 85–291) on all aspects of the text.

9 *Rules for the Direction of the Mind*, translated by Dugald Murdoch, in: *The Philosophical Writings of Descartes*, translated by John Cottingham, Robert Stoothoff, Dugald Murdoch, and (for vol. III only) Anthony Kenny (Cambridge: Cambridge University Press, 1984 [vol. II], 1985 [vol. I], and 1991 [vol. III]), vol. I, pp. 7–76. This edition presents a fine translation with a short preface as well as with some brief notes. The present edition has profitted a great deal from this useful predecessor.

Finally, an important supplementary text to the *Regulæ* is: Antoine Arnauld and Pierre Nicole, *La logique ou l'art de penser, contenant, outre les règles communes, plusieurs observations nouvelles, propres à former le jugement, Édition critique par Pierre Clair et François Girbal* (Paris, 1981). For the authors of '*La logique de Port-Royal*' indicate that, when preparing the second edition of their work (1664),[238] they employed 'a manuscript of … Descartes … provided by Clerselier'.[239] It is surely the *Regulæ*, since in chapter 2 of part 4 of the *Logic or the Art of Thinking* they provide, for instance, a loose paraphrase of the latter part of Rule XIII. This paraphrase also contains a passage at a place corresponding to a lacuna in the middle of the same rule. Thus it might be a paraphrase of some of what is missing. For the present edition the relevant passage has been reproduced, with modernized orthography, as the Appendix.[240]

So much for the editorial history of the *Regulæ*, that is, at least for the limited purposes of the present edition.

[238] The first edition had appeared in 1662 – containing nothing from Descartes' *Regulæ*.

[239] Shortly before the material reproduced in the Appendix of the present edition one finds the following footnote: 'La plus grande partie de tout ce que l'on dit ici des questions, a été tiré d'un manuscrit de feu Monsieur Descartes, que Monsieur Clerselier a eu la bonté de prêter.' (Cf. *La logique ou l'art de penser*, p. 300.) In other words, 'most' of what is going to be said here about (the) 'questions' is taken from 'a manuscript of Descartes provided by Clerselier'.

[240] See *La logique ou l'art de penser*, pp. 300–301.

Bibliography: Observations, Opinions, Orientations

Since the bibliography of the present edition is primarily and ultimately a bibliography of items 'on' Descartes, it contains a lacuna due to the fact that it does not generally include literature from his own time. Thus one might also want to bear in mind the following short list of crucial literature generated by Descartes' 'contemporaries' (in alphabetical order):

1 Francis Bacon de Verulam (1561–1626), *Instauratio magna*, pt. II: *Novum organum sive indicia vera de interpretatione naturæ* (London, 1620). The *New Instrument* of the *Great Renewal* contains profound reflections on 'a new methodology' almost contemporaneous with those of Descartes' *Regulæ*. The former focuses on physics; the latter concentrates on mathematics. Together they provide much of the theoretical basis for the mathematization of physics that so dominates modern natural science.

2 Isaac Beeckman (1588–1637), *Journal tenu par … de 1604 à 1634* (4 vols.), ed. C. de Waard (The Hague, 1939–1953). These scientific diaries contain the intellectual legacy of a 'Renaissance person' from whom Descartes learned some mathematics and some mechanics. They first met toward the end of 1618,[241] that is, just before the work on the *Regulæ* was begun, and they were in touch once again toward the end of 1628,[242] that is, just before it was suspended.

3 Pierre Charron (1541–1603), *De la sagesse* (Bordeaux, 1601/1604; Leiden, 1646). The attempt in *On Wisdom* to harmonize the Church's dogmatic absolutism and Montaigne's skeptical relativism yields a cogent but epigonic statement of the retrofragability of human rationality.

4 Galileo Galilei (1564–1642), *Dialogo sopra i due massimi sistemi del mondo, tolemaico e copernicano* (Florence, 1632). The *Dialogue on the Two Chief World Systems* was the occasion for the second 'condemnation' of Galileo by the Inquisition in 1633 (the first 'warning' had been in 1616), which also plunged Descartes into despair about the prospects of the Copernican revolution as well as of his own *Treatise on the World*.

5 Ignatius of Loyola (1491–1556), *Exercitia spiritualia* (Rome, 1548). The *Spiritual Exercises* are the book to read for insight into the intellectual, moral, and religious worldview of Descartes' college teachers.

6 Marin Mersenne (1588–1648), *La vérité des sciences: Contre les sceptiques ou Pyrrhoniens* (Paris, 1625). *The Truth of the Sciences: Against the Skeptics or Pyrrhonists* was aimed at the skeptical revival, for example, by Montaigne, by Charron, and by Sanchez,[243] although Descartes may not have become *especially* interested in skepticism until the 1630's.

7 Idem, *Correspondance du P. … , religieux minime* (17 vols.), ed. C. de Waard et al. (Paris, 1932–1988). This represents an encyclopedia of scientific development during the second quarter of the seventeenth century, the compiler being Descartes' very own philosophical agent.

8 Michel de Montaigne (1533–1592), *Essais* (Bordeaux, 1580/1582 [bks. I–II] and 1588 [incl. bk. III]; Paris, 1595 [posthumous ed.]). The *Essays* are by far the single most important work to study in order to comprehend what alternative there was to Descartes' brand of rationalism. For, whereas Descartes asserts that 'reason' is essentially homogeneous in all human beings, Montaigne claims that it is irreducibly heterogeneous – with inevitable implications for the role of rules of method.[244] In fact, understanding Descartes presupposes appreciating Montaigne. Of course, Montaigne's skepticism cannot possibly be Pyrrhonism without further ado.

[241] Cf. AT, X, 15 ff.

[242] Cf. ibid., p. 329 ff.

[243] See Francisco Sanchez (1552–1623), *Quod nihil scitur* (*That Nothing Is Known*) (Lyons, 1581).

[244] The two key texts in this regard are Descartes' *Discourse on the Method*, according to which rationality is essentially the same for all (cf., e.g., pt. I, § 1 ff.), and Montaigne's *An Apology for Raymond Sebond*, according to which 'reason' is a phenomenal and malleable construct and instrument that inevitably varies from one individual to another: 'J'appelle toujours "raison" cette apparence de discours que chacun forge en soi; cette raison, de la condition de laquelle il y en peut avoir cent contraires autour d'un même sujet, c'est un instrument de plomb et de cire, allongeable, ployable et accommodable à tout biais et à toutes mesures; il ne reste que la suffisance de le savoir contourner.'

9 Adrianus Romanus (1561–1615), *In Archimedis circuli dimensionem expositio et analysis: Apologia pro Archimede* … (Würzburg, 1597) and *Universae mathesis idea, qua mathematicae universim sumptae natura, praestantia, usus et distributio brevissime proponuntur* (Würzburg, 1602). Here the Belgian mathematician develops the idea of a *mathesis universalis* in detail and is arguably the key source for Descartes' idea of the same. This is recommended reading especially for those who might be tempted to conflate *mathesis* and *methodus*.

10 François Viète (1540–1603), *In artem analyticem Isagoge, seorsim excussa ab opere restitutae mathematicae Analyseos, seu, Algebra nova* (Tours, 1591; Paris, 1624/1631; Leiden, 1635/1646). Vieta's modern idea of *numerus* as the number intending a concept of quantity – versus the ancient idea of *arithmos* as the number intending a plethora of things – made possible the *New Algebra*.[245] But Descartes learned more from the competent Jesuit Christoph Clavius (1537–1612), 'the Euclid of his time'.

The key philosophical monographs 'on' the *Regulæ* are (this time in chronological order):

1 Leslie John Beck, *The Method of Descartes: A Study of the 'Regulæ'* (Oxford, 1952; New York, 1987). This fine book, minimizing the historical context and maximizing the philosophical text, remains the most systematic and thorough treatment of the *Regulæ* in English.

2 Harold H. Joachim, *Descartes's Rules for the Direction of the Mind: Reconstructed from Notes taken by his Pupils*, ed. E. E. Harris (London/New York, 1957; Westport, CT, 1979). This is a useful set of introductory lectures prepared around 1930 and now extant only in a version which did not enjoy the benefit of a final revision by the author.

3 Jean-Paul Weber, *La constitution du texte des 'Regulæ'* (Paris, 1964). This book is perhaps the finest example of heroic hermeneutics in all of Cartesian scholarship. Presenting a veritable 'stratigraphie' of the work, it is an uncompromising attempt to grasp the text as its own context.

4 Giovanni Crapulli, *'Mathesis universalis': Genesi di un'idea nel XVI secolo* (Rome, 1969). This is the best treatment of the historical and philosophical background of the idea of a 'mathesis universalis' in the century before Descartes, although those who are looking for anything *on his* concept of a 'mathesis universalis' here are going to be disappointed.

5 Lüder Gäbe, *Descartes' Selbstkritik: Untersuchungen zur Philosophie des jungen Descartes* (Hamburg, 1972). This is a careful analysis of when, how, and why – to put it simply – 'Descartes became a Cartesian', emphasizing his later criticism of his earlier thought. Timing alone renders an interpretation of the *Regulæ* crucial to the thesis.[246]

6 Jean-Luc Marion, *Sur l'ontologie grise de Descartes: Science cartésienne et savoir aristotélicien dans les 'Regulæ'* (Paris, 1975/1979/1981). This study is a conceptual reconstruction of the text of the *Regulæ*, emphasizing content over structure – contra Weber – and transcending the view of Descartes as a straightforward anti-Aristotelian.

Cf. Screech's translation, op. cit., pp. 636–637: 'By *reason* I always mean that appearance of rationality which each of us constructs for himself – the kind of reason which can characteristically have a thousand contrary reactions to the same subject and is like a tool of malleable lead or wax: it can be stretched, bent or adapted to any size or to any bias; if you are clever, you can learn to mould it.' Thus Montaigne's 'deconstructionist' conception of human rationality is a remarkably *premodern* 'postmodern' phenomenon.

[245] What Descartes may have known about Vieta's work and when he might have known it, is not uncontroversial – cf., e.g., AT, XII, 212 ff.

[246] See, e.g., the first lines of p. 1: 'Frühestens im Winter 1628/9 wird Descartes zu einem Cartesianer. Die wissenschaftliche Methodenlehre, die er zwischen 1619 und 1628 entwickelt hatte und deren schriftliche Fixierung in dem Fragment der *Regulæ ad directionem ingenii* er um 1628 einer letzten Redaktion unterzog, beruht auf Prinzipien, die mit der Philosophie Descartes' nach 1629 im Widerspruch stehen. Descartes ist auf dem Wege einer Selbstkritik zu einem Cartesianer geworden.'

Basic for the intellectual biography of Descartes and (or) for the historical background of the *Regulæ* are (again in chronological order):

1 Adrien Baillet, *La vie de Monsieur Des-Cartes* (2 vols.) (Paris, 1691/1961; Geneva, 1970; Hildesheim/New York, 1972). This almost contemporary life of Descartes, which is not specifically philosophical, is still the basic biography and the best place to start. The very accessible abridgement of it is: *Vie de Monsieur Descartes* (Paris, 1692/1946/1950).

2 Joseph Millet, *Descartes – Sa vie, ses travaux, ses découvertes avant 1637* (Paris, 1867). This pioneering work was the first scholarly attempt to offer an interpretation of the perplexing early fragments[247] and to try to propose a documentation of the philosopher's formative years.

3 Elizabeth S. Haldane, *Descartes: His Life and Times* (London/New York, 1905). To be sure, this biography predates both the Adam and Tannery edition of the works of Descartes and Adam's own life of the philosopher. None the less, it is still well worth reading.

4 Charles Adam, *Vie et œuvres de Descartes: Étude historique. Supplément à l'édition de Descartes* (Paris, 1910). This ponderous study – volume XII of the *Œuvres de Descartes* – is the first modern critical biography of the philosopher, with chapters on every phase of his life, including a pair on 'La jeunesse de Descartes', one on the period from 1612 to 1619 and another on that from 1620 to 1628. But neither is of much use for the interpretation of the *Regulæ*. Adam's revised summary of his biography is: *Descartes, sa vie et son œuvre* (Paris, 1937).

5 Gustave Cohen, *Écrivains français en Hollande dans la première moitié du XVIIe siècle* (Paris/The Hague, 1921). By discovering the cultural, intellectual, and social milieu of *les français gentilshommes* in Holland before and during Descartes' time, this account renders plausible, for the first time, why the philosopher might have wanted to go there.

6 J. Sirven, *Les années d'apprentissage de Descartes (1596–1628)* (Albi, 1928; Paris, 1930; New York, 1987). This study, the classic account of Descartes' years at the Collège de La Flèche as well as of his earliest writings, argues – in a remarkable reversal – that the four rules of the *Discourse on the Method* (1637) date back to opuscules of 1619–1620, thus apprehending the rules of 'the *Regulæ* of 1628' as a later development (at least, that is, from the limited perspective of someone writing at this time).

7 Henri Gouhier, *Les premières pensées de Descartes: Contribution à l'histoire de l'anti-renaissance* (Paris, 1958/1979). This study, which also provides a critical overview of the previous accounts of Descartes' 'years of apprenticeship' from Baillet to Sirven, finds 'the young Descartes', by way of his 'first thoughts', 'reacting violently against the spirit of "the Renaissance"'[248] – which the reader may question.

8 Alexandre Tillmann, *L'itinéraire du jeune Descartes* (Lille/Paris, 1976). Not only is this meticulous study the latest and perhaps best account of the early Descartes, but it also has a lot to contribute to the perennial debates surrounding the *Entstehungsgeschichte* of the *Regulæ*.

9 Stephen Gaukroger, *Descartes: An Intellectual Biography* (Oxford, 1995). This excellent book, the only one of its kind in English, explains, in detail, not only what Descartes thought and when he thought it, but also why. It is a *philosophical* biography, but – understandably – it could not be entitled thus. The *Regulæ* are treated in chapters 4 and 5.

On the Cartesian method beyond the *Regulæ* one may consult:

1 Étienne Gilson (ed.), *René Descartes: Discours de la méthode: Texte et commentaire* (Paris, 1925/1926/1962/1966/1976/1987). This line-by-line – and sometimes word-by-word – commentary on the *Discourse* is still one of the best treatments of Descartes' method. It closes with some detailed parallels between texts of the *Discourse* and texts of the *Regulæ*.

2 George Heffernan, *René Descartes: Discours de la méthode pour bien conduire sa raison et chercher la vérité dans les sciences / Discourse on the Method of Conducting One's Reason Well and of Seeking the Truth in the*

[247] Cf. *Opuscules de 1619–1621*, in: AT, X, 171–276.

[248] See p. 9: '… le jeune Descartes réagissant violemment contre l'esprit de "la Renaissance" au moment où il échappe au "Moyen âge" … .'

Sciences, A Bilingual Edition and an Interpretation of René Descartes' Philosophy of Method (Notre Dame/London, 1994). This edition argues the case that it is impossible to understand Descartes' method by trying to read the text of the *Discourse on the Method* out of context.

On the Cartesian method and logic one should see:

1 Stephen Gaukroger, *Cartesian Logic: An Essay on Descartes's Conception of Inference* (Oxford/New York, 1989). This concise and precise study, a treatment of Descartes' interpretation of inference as an instantaneous apprehension in accordance with the natural light of reason – in contrast to the Aristotelian view of it as a discursive process –, argues that Descartes' account played a key role in the development of an understanding of the nature of inference.[249] Gaukroger refers repeatedly to the *Regulæ*.

Some reference keys to the Cartesian method are the following:

1 Étienne Gilson, *Index scolastico-cartésien* (Paris, 1913/1979). This remains the definitive record of Descartes' indebtedness to Scholastic sources, which was somehow long overlooked by many.

2 Jean-Robert Armogathe and Jean-Luc Marion, *Index des 'Regulæ ad directionem ingenii' de René Descartes. Avec des listes de leçons et conjectures établies par G. Crapulli* (Rome, 1976). One major difference between this index and that of the present edition is that the latter provides the information about declensions and about conjugations that most readers need to become actively collaborating co-translators.

3 John Cottingham, *A Descartes Dictionary* (Oxford/Cambridge, MA, 1993). This is a work of admirable erudition, whose real strength lies in the manner in which it defines the Cartesian termini technici by means of rigorous contextualization. This edition has plundered it shamelessly.

'On' Descartes' method, project, and concept of rationality one may consult:

1 Paul Feyerabend, *Against Method* (London/New York, 1975/1988/1993). Although Feyerabend mentions Descartes only twice (pp. 49 and 54) and the *Regulæ* not even once, a highly effective way of reading the latter is by juxtaposing the 21 rules found there and the 21 'counterrules' (including the introduction) of *Against Method*, thus by analyzing – point by counterpoint – first the ones and then the others. Hermeneutical justice demands that this also be a legitimate way of reading *Against Method*. In any case, one can argue that it is just as serious a misunderstanding to view the author of the *Regulæ* as a 'methodological absolutist' as it is to regard the author of *Against Method* as a 'naive anarchist'.[250] After all, the crucial dictum 'anything goes' is itself a text that must be understood in a context – the point being, not that 'no methods have any uses', but that 'all methodologies … have their limits'.[251]

2 Jean-François Lyotard, *La condition postmoderne: Rapport sur le savoir* (Paris, 1979). Here Descartes' *Regulæ* are characterized as an example of an – inevitably inadequate – attempt 'to fix the rules by means of which a denotative utterance can obtain the assent of the addressee'.[252] Lyotard's essay on 'legitimation', a more or less accurate diagnosis of the condition of a humanity that can no longer afford naively to believe in certain long-held ideals of modern rationalism or of 'rational' modernity, is difficult to characterize. For, on one level, it is possible to understand it as a plea for pluralism that leaves open the possibility that for certain well-defined purposes some language-games are better than others. On another level, it is more probable than not that it be interpreted as an unqualified

[249] It also offers more than adequate compensation for what William and Martha Kneale left out – their *The Development of Logic* (Oxford, 1962) does not appear to do justice to Descartes' contribution to the evolution of logic.

[250] Cf. Feyerabend's self-understanding, *Against Method*, p. 231.

[251] See ibid., pp. 14, 18–19, 23, 231, etc.

[252] See Lyotard, *La condition postmoderne*, p. 69: '… Descartes … [a] … essayé de fixer les règles par lesquelles un énoncé à valeur dénotative peut obtenir l'adhésion du destinataire.' The reference is to the *Regulæ* and to the *Principles of Philosophy* (see ibid., fn. 137).

assault on the notion that one language-game, for example, that of modern mathematical science with its philosophical foundations, is better than another – with no special attention being paid to the respect in which this is supposed to be true or not. The difference between the two interpretations amounts to the distinction between an attack on absolutism and a defense of relativism. But there is a pragmatic mean between the dogmatic extreme, according to which science is supposed to be the only kind of knowledge, and the skeptical extreme, according to which science is supposed to be just another kind of ignorance.[253] *Everything is relative, but not absolutely.*[254] However fashionable it may be to do so, to look at Descartes' philosophy as a paradigmatic instance of modernity, that is, as a prime example of all that which, from a postmodern perspective, has lost its claim to legitimacy, is to understand nothing.[255] Indeed, it is an imperative of charitable interpretation that one take into consideration how those who are to be understood understand themselves.[256] Thus no understanding of Descartes or of his philosophy which fails to appreciate his understanding of himself and of his philosophy has any real chance of understanding him or his philosophy.[257] *And the single most impor-*

[253] Cf., e.g., Paul R. Gross and Norman Levitt, *Higher Superstition: The Academic Left and Its Quarrels with Science* (Baltimore, 1994). The argument of this book is polemical, but in the constructive, not in the destructive, sense.

[254] Contra Sextus Empiricus, *Outlines of Scepticism*, bk. I, ch. XIV, secs. 135–140.

[255] The more careless critique of 'modernity' from a 'postmodern' perspective has even led to such absurdities as the following assertion (unmitigated by context): 'The Unabomber turns out to be a Cartesian rationalist … .' See Alex Beam, 'Sympathy for the Devil', *The Boston Globe*, April 10, 1996, p. 66. After all, René Descartes and Theodore Kaczynski were both mathematicians. Of course, Joseph Vissarionovich Dzhugashvili and Karol Jozef Wojtyla were both seminarians. That, too, explains a lot.

[256] Thus one might formulate the positive version of the 'golden' rule of hermeneutics in the following way: 'Understand others as you would be understood by them.' The negative version might be formulated as follows: 'Do not misunderstand others as you would not be misunderstood by them.' Cf. Isocrates, *Nicocles*, sec. 61; Seneca, *Epistulae morales*, ch. 94, sec. 43; and Aelius Lampridius, *Vita of Severus Alexander*, ch. 51. Cf. also, of course, *Tobias*, v. 4, l. 16; *Matthew*, 7, 12; and *Luke*, 6, 31. This is not 'moralizing' precisely because understanding others is usually a question of one's own character as well.

[257] Perhaps the real distinction between the Classical hermeneutics reinvented by Gadamer, who holds it to be practicable that one try to understand others even better than they understood themselves (cf. *Wahrheit und Methode*, almost passim, but esp. p. 195 ff.), and the anti-philological, deconstructionist hermeneutics inspired by Nietzsche, who claims, ironically, that 'there is something insulting about being understood' (cf. Friedrich Nietzsche, *Nachgelassene Fragmente: Herbst 1885 bis Herbst 1887*, *Kritische Gesamtausgabe*, ed. G. Colli and M. Montinari, sec. 8, vol. 1 [Berlin/New York, 1974], p. 47: '… es ist etwas Beleidigendes darin, verstanden zu werden …'), lies, not so much in naive optimism versus cynical pessimism about the possibility of mutual understanding, as much rather in the presence versus absence of the good will on the part of the one person to understand, and to be understood by, the other. And perhaps it is this difference which has also manifested itself in the encounter between Gadamer and Derrida regarding the conditions of the (im)possibility of mutual understanding. Cf., e.g., P. Forget (ed.), *Text und Interpretation: Deutsch-französische Debatte mit Beiträgen von J. Derrida, Ph. Forget, M. Frank, H.-G. Gadamer, J. Greisch und F. Laruelle* (Munich, 1984), and D. P. Michelfelder and R. E. Palmer (eds.), *Dialogue & Deconstruction: The Gadamer-Derrida Encounter* (Albany, 1989). It is one thing to entertain a certain healthy skepticism vis-à-vis the prospects of understanding, and of being understood by, the other; it is another thing to question whether it is worthwhile even to attempt to understand, and to be understood by, the other. In ethics, *ought* implies *can*: One cannot be obligated to do what one cannot do. In hermeneutics, which possesses an ineluctable technical dimension, *cannot* threatens to entail *ought not*: If one cannot understand, and cannot be understood by, the other, then why try? In any case, since it is by understanding, and by being understood by, the other that one understands oneself and thus anything at all, who and what would be left to understand, and to be understood by, if one could not understand, and could not be understood by, anyone or anything other than oneself? But understanding, and being understood, is a matter, not of all or nothing, but of grades, degrees, and levels. Yet that is 'ein *zu* weites Feld'.

taut thing to consider about Descartes' self-apprehension is that he understands his philosophy as striving toward a mean of rational pragmatism between the excesses of Scholastic absolutism, on the one hand, and the defects of Pyrrhonian relativism, on the other hand. For, acutely aware of the distinction between intent and effect, Descartes realizes that the former extreme would substitute inquisition for investigation, while the latter extreme would replace science with superstition. Of course, to everything there is a time. Times change. Paradigms shift. What was once a mean can now become an extreme and vice versa. But the same also holds for present positions.

3 Stephen Toulmin, *Cosmopolis: The Hidden Agenda of Modernity* (Chicago, 1990). Emphasizing the essential limitations of many views in Descartes' *Discourse on the Method*, one of 'the founding documents of modern thought',[258] this most perceptive study of the meaning of modernity questions the validity of the vision of 'Cosmopolis', that is, a society as rationally ordered as Newtonian nature, with its 'hidden agenda', namely, that 'the human things' could be fitted into exact rational categories. To be sure, one can ask what other course modern philosophy and science would have taken if they had been oriented on Montaigne's *Essays* rather than on Descartes' *Discourse*. None the less, one may also wonder whether this course would not have been substantially different if it had been charted rather by Descartes' *Regula* than by his *Discourse*.

For further information the reader is referred to the bibliography.

The Uniqueness of the Present Edition

Now the present edition of the *Regula* is unique, not only because it is the only bilingual Latin–English edition as well as the only independent and self-sufficient English edition of Descartes' *Rules* available, but also because it offers substantial contextualization of the text by means of a comprehensive index, an accompanying glossary, and an extensive bibliography. Therefore, as far as precedents are concerned, this edition seeks to provide a Latin–English counterpart both to the Latin–German edition of Springmeyer, Gäbe, and Zekl and to the Latin–French edition of Le Roy.

As has been indicated, the present edition does not seek to repeat all the work of 'AT', 'C', and 'SGZ' by reproducing, in the apparatus criticus to the Latin text, all the manuscript variants of 'H', 'L', 'N', and 'A'. For all the previous editions still contain even obvious printing errors, and for this reason alone not all the manuscript variants are significant, philosophically or otherwise.

As far as the footnotes to the English translation are concerned, it suffices to remark that, while it would have been possible, of course, to comment in detail on virtually each and every sentence of the *Rules*, still, the main aim here has been much more modest, namely, to provide, in the form of references, leads, and clues, a representative sampling of those texts which constitute the context of the text. Necessarily, then, the more one knows about the text, the less satisfied one will be with the context.

In the present edition the square brackets ('[...]') in the margin of the Latin text contain numbers giving the pagination of the edition of Adam and Tannery. The numbers at the beginning of each paragraph in the English text indicate the division into paragraphs of the Latin text, to which they have also been added for convenient reference. Nor are the headings of the individual rules as given in the table of contents and in the text from the author, but rather have they been provided by the editor based on

[258] See Toulmin, *Cosmopolis*, p. 14.

the content of each rule. Similarly, both the division of the work into three books and the titles thereof are based on the formal and material considerations expressed in places such as Rules 8 and 12.

As far as the present translation is concerned, the main aim has been to achieve a version that, with respect both to style and to substance, would be *both as literal as possible and as liberal as necessary*. Since I have made more systematic remarks about the philosophy of translating elsewhere,[259] I only want to reiterate here my prevailing thought that, in so far as the thesis of 'the indeterminacy of translation' is taken to be applicable to the translation of the signs of one language into those of another, this thesis cannot be verified or falsified in general, but rather only in particular. Claims without cases are empty, and cases without claims are blind.[260]

The selective index is easy to use. Its numbers refer to the pages in the edition of Adam and Tannery, and, once again, these page numbers are provided in the square brackets in the margin of the Latin text of the edition. One should note that the data for the comparative and superlative forms of adjectives and of adverbs are to be found among the data for the simple forms.

The English–Latin glossary is equally easy to use. Its main aim is to serve those readers who will be tracing entries via the translation, whereas the index must, of course, relate directly and immediately to the original.

Since it is axiomatic that every text has its context, one should not expect absolute completeness or total consistency in the 'correspondences' – for lack of a better term – between the index, the glossary, and the texts. A small amount of overlapping and of underlapping is ineradicable.

To be sure, the bibliography is restricted to books and to monographs; none the less, given the very well-anthologized state of the literature on Descartes in articles, this is perhaps not an acute flaw.

[259] See Josef Simon, *Philosophy of the Sign*, trans. G. Hefferman (Albany, 1993), pp. 4–10 (of the Translator's Introduction).

[260] In his review of my pilot bilingual edition of Descartes' *Meditationes de prima philosophia / Meditations on First Philosophy* Roy Martinez claims that the translation is done 'with an English that is wanting in syntax' (*Teaching Philosophy* [ed. Arnold Wilson], vol. 16, no. 2 [June, 1993], p. 184). Hoping to render his generalization plausible, Martinez cites – aside from an isolated example of the subjunctive that is a matter of taste – only a fragment of a single sentence (ibid., ll. 15–16). Yet the complete translation of the sentence at issue, from Meditation III (*AT* 7:), reads thus: 'But of these my ideas, besides that one which exhibits me myself to me – about which there can be no difficulty here –, there is another one, which represents God, there are others, which represent corporeal and inanimate things, others, which represent angels, others, which represent animals, and finally others, which represent other human beings similar to me.' As the reviewer might have recognized had he read beyond the second dash – where his quotation of my rendition inexplicably ends –, there is nothing syntactically deficient about this translation. Of course, this is not to say that it cannot be improved; on the contrary, it is already being revised. In fact, however, scholars actively engaged in research on Descartes' philosophy do not appear generally to share the opinion of Martinez. See, e.g., Kenneth P. Winkler, 'Descartes and the Names of God', *American Catholic Philosophical Quarterly: Descartes*, ed. Stephen Voss, vol. LXVII, no. 4 (Autumn, 1993), pp. 451–466, p. 453, fn. 9; Stephen L. Wagner, 'Descartes' Wax: Discovering the Nature of Mind', *History of Philosophy Quarterly: Descartes*, vol. 12, no. 2 (April, 1995), pp. 165–183, fns. 10, 13, and 14; etc. In any case, my translation techniques are completely consistent with the theory and praxis of such experts as Werner Koller – see his *Einführung in die Übersetzungswissenschaft* (Heidelberg–Wiesbaden, 1979/1992).

I alone am fully responsible for any errors or flaws or idiosyncrasies that might remain.[261] May the readers be kind enough to point them out to me, thereby making their own contributions to the improvement of the edition.[262] For this I wish to express my gratitude in advance.

[261] Since having to answer for one's own errors is enough already without having to worry about those of others as well, I wish to note that my bilingual edition of the *Discours de la méthode* / *Discourse on the Method* was reproduced from camera-ready copy; that I submitted a correct title-page; and that the errors in the French on the printed title-page are the result of the fact that the publisher altered the submitted page, which had been designed exactly to their specifications, without consultation and without proof-reading.

[262] P.S.: On second thought, it may not have been acceptable to bracket out, from the inquiry into 'ingenium' above, the question about the relationship between natural intelligence and artificial intelligence. On the one hand, doing so is justified in so far as the translation of 'ingenium' as '*natural* intelligence' is likely to provoke the question as to what other kind of intelligence there might be in the *Regulæ*. For many philosophers, including Descartes, are familiar with a distinction, however vague and obscure, between the natural and the artificial, and one may jump to the conclusion that in the *Regulæ* he is proceeding from a distinction between natural intelligence and artificial intelligence. Yet nothing could be further from the truth, if only because Descartes is convinced that it is impossible to explain thought or language or intelligence mechanistically (cf., e.g., *Discourse*, pt. V, passim, and esp. §§ 9–12). On the other hand, he would witness the invention, by Blaise Pascal (1623–1662) in 1642, of the first computer in the form of a calculating machine – the first genuine adding machine capable of operating in such a way as to carry tens to the next column. Even as these pages go to press, the second official chess match between a reigning world champion and a computer is ending with Garry Kasparov's loss (1 win, 2 losses, 3 draws) to IBM's Deep Blue (May 11, 1997). But only those who do not read beyond the headlines can regard this as a triumph of artificial intelligence. Rather, the question is what humans must do in order to enable a computer to beat themselves at chess. For C. J. Tan and his IBM team had two alternative approaches to a solution to the problem of how to program a computer to play against a grandmaster. The first emphasizes pure calculating power, i.e., the computer is made to calculate as many combinations as deeply as possible, in order, after having done so, to find the best line of play. The second stresses getting the computer to be selective, i.e., most moves are screened out from the beginning, in order to concentrate on a few promising lines. After all, the number of possible chess games – 10 to the 120th power – is greater than the number of atoms in the universe. A human of Kasparov's ability selects moves on the basis of experience, analysis, and intuition. Already the first match (1996) showed that Kasparov, the most highly rated player in the history of the game as measured by the official Elo Scale, could not match the computer's calculating capacity. In fact, Deep Blue calculates millions of moves per second and billions per minute. Kasparov, who knew that Deep Blue had been programmed mainly according to the method, not of selectivity, but of force, strived for positions in which the computer would mostly have to make, not tactical decisions based on straightforward calculations, but strategic decisions based on positional intuitions. Thus he won (3 wins, 1 loss, 2 draws). 'Deeper Blue' won the rematch because its calculating capacity was vastly increased, it was taught by a grandmaster (Joel Benjamin) 'to think like a grandmaster', and Kasparov blundered away the decisive game in the shortest defeat of his career. The Cartesian point of all this is that the real power of the machine's artificial intelligence lies in deduction, whereas the true strength of the human's natural intelligence lies both in intuition and in induction. For the *Regulæ* revolve around the comparison of and the contrast between these different modes of inference. And Descartes holds intuition to be epistemically more basic than deduction. Thus the computer has to think like a human being. So natural intelligence remains the standard for artificial intelligence; nor is the latter a model for the former. And Deep Blue's defeat of Kasparov is a victory, not of machine over man, but of man and machine over man alone.

René Descartes REGULÆ AD DIRECTIONEM INGENII

RULES FOR THE DIRECTION OF THE NATURAL INTELLIGENCE

Latin-English

REGULÆ

AD DIRECTIONEM INGENII[1]

LIBER I

DE PROPOSITIONIBUS SIMPLICIBUS ET ILLATIONIBUS

Regula I

De sapientia et scientia

Studiorum finis esse debet ingenii directio ad solida et vera, de iis omnibus quae occurrunt, proferenda judicia.

1. Ea est hominum consuetudo, ut, quoties aliquam similitudinem inter duas res agnoscunt, de utraque judicent, etiam in eo in quo sunt diversae, quod de alterutra verum esse compererunt. Ita scientias, quae totae in animi cognitione consistunt, cum artibus, quae aliquem corporis usum habitumque desiderant, male conferentes, videntesque non omnes artes simul ab eodem homine esse addiscendas, sed illum in optimum artifi-
[360] cem facilius evadere, qui unicam tantum exercet, | quoniam eaedem manus agris colendis et citharae pulsandae, vel pluribus ejusmodi diversis officiis, non tam commode, quam unico ex illis possunt aptari; idem de scientiis etiam crediderunt, illasque pro diversitate objectorum ab invicem distinguentes, singulas seorsim et aliis omnibus omissis quaerendas esse sunt arbitrati. In quo sane decepti sunt. Nam cum scientiae omnes nihil aliud sint quam humana sapientia,[2] quae semper una et eadem manet, quantumvis differentibus subjectis applicata, nec majorem ab illis distinctionem mutuatur, quam solis lumen a rerum, quas illustrat, varietate, non opus est ingenia limitibus

[1] A, AT, C, and SGZ: *Regulæ ad directionem ingenii*. H and L: *Regulæ de inquirenda veritate*. N: *Regulen van de bestieringe des verstants*. In the annotations to the Latin text the following abbreviations are employed in order to distinguish between the selected variants of the different editions: 'H' – the Hanover edition (acquired by Leibniz probably in 1678); 'L' – Leibniz' revised version of H (to be dated probably to 1678 and the following years); 'N' – Glazemaker's Dutch translation (1684); 'A' – the first published Latin edition or the Amsterdam edition (1701); 'AT' – the edition in the *Œuvres de Descartes* (vol. X) of Adam and Tannery (1908); 'C' – Crapulli's critical edition (1965/1966); and 'SGZ' – the bilingual Latin-German edition of Springmeyer, Gäbe, und Zekl (1973). For complete information on these editions see the philological section of the introduction and the beginning of the bibliography of the present edition.

[2] H, A, AT, and C: sapientia. SGZ: scientia. N: wijsheit.

RULES FOR THE DIRECTION

OF THE NATURAL INTELLIGENCE

BOOK ONE

ON SIMPLE PROPOSITIONS AND INFERENCES

Rule One

On Wisdom and Science

The goal of studies should be the direction of the natural intelligence[1] toward the formation of solid and true judgments about all the things that occur to it.

1. It is a habit of human beings that, whenever they recognize some similarity between two things, they judge of the one what they have found to be true of the other, even in that respect in which the two are different. Thus, wrongly comparing the sciences, which consist entirely of knowledge possessed by the mind, with the arts, which demand a certain application and habituation of the body, and seeing that the same human being cannot simultaneously master all the arts, but that someone who practices only one art develops more easily into an excellent craftsman – since the same hands cannot adapt as conveniently to cultivating the land and to playing the harp or to several different tasks of this kind as to only one of them –, they have also believed the same about the sciences. And, distinguishing them from each other by the diversity of their objects, they have thought that the sciences have to be studied individually, each one separately and after all the others have been omitted. But they are surely mistaken about this. For, since all the sciences are nothing other than human wisdom, which always remains one and the same, however applied to different subjects, and which derives no greater distinction from them than the light of the sun does from the variety of the things on which it shines, there is no need to constrain the natural intelligence

[1] On the distinction between the translation of 'ingenium' in the 'facultative' sense as '*the* natural intelligence' and in the 'functional' sense as 'natural *intelligence*' cf. the other contexts of the text, namely, R. 1, § 1 (2x), R. 2, R. 2, §§ 3 and 5, R. 3, §§ 1, 2, and 9 (2x), R. 4, §§ 1 (2x) and 3–5 (3x in 5), R. 6, § 6 (2x), R. 7, §§ 1 and 4, R. 8, §§ 2, 5 (2x), 8, and 11 (4x), R. 9, R. 9, §§ 1, 2, and 4, R. 10, R. 10, § 1–3 (2x in 2), R. 11, R. 11, §§ 2 and 4–5, R. 12, §§ 10 (2x), 20, 23 (3x), 25, and 27 (2x), R. 13, §§ 5 and 8–10, R. 14, §§ 1 and 14, and R. 16, §§ 2 and 6. Perhaps '[the] natural intelligence' is such a fitting translation of 'ingenium' because Descartes' main aim in the *Rules* is to show that and how the artificial, in the form of method (or of rules thereof), can improve upon the natural, in the form of intelligence – cf., e.g., R. 9, § 4, where, in conjunction with R. 6, §§ 1 and 5, it becomes clear that the word 'art' itself can be, but, of course, does not have to be, just another word for 'method'.

ullis cohibere; neque enim nos unius veritatis cognitio, veluti unius artis usus, ab alterius inventione dimovet, sed potius juvat. Et profecto mirum mihi videtur, plerosque hominum plantarum vires,[3] siderum motus, metallorum transmutationes, similiumque disciplinarum objecta diligentissime perscrutari, atque interim fere nullos de bona mente, sive de hac universali[4] Sapientia, cogitare, cum tamen alia omnia non tam propter se, quam quia ad hanc aliquid conferunt, sint aestimanda. Ac proinde non immerito hanc regulam primam omnium proponimus, quia nihil prius a recta quaerendae veritatis via nos abducit,[5] quam si non ad hunc finem generalem, sed ad aliquos particulares studia dirigamus. Non de perversis loquor et damnandis, ut sunt inanis gloria vel lucrum turpe: ad hos enim perspicuum est ficatas rationes, et vulgi ingeniis accommoda-
[361] ta ludibria, longe magis compen|diosum iter aperire, quam possit solida veri cognitio. Sed de honestis etiam intelligo et laudandis, quia ab his decipimur saepe subtilius; ut si quaeramus scientias utiles ad vitae commoda, vel ad illam voluptatem, quae in veri contemplatione reperitur, et quae fere unica est integra et nullis turbata doloribus in hac vita felicitas. Hos enim scientiarum fructus legitimos possumus quidem exspectare: sed, si de illis inter studendum cogitemus, saepe efficiunt, ut multa, quae ad aliarum rerum cognitionem necessaria sunt, vel quia prima fronte parum utilia, vel quia parum

[3] A, C, and SGZ: plerosque hominum plantarum vires. H: plerosque hominum corpora, plantarum vires. L and AT: plerosque hominum mores, plantarum vires. N (clause): ik ben verwondert van dat de meeste menschen zeer naerstiglijk de krachten der planten.

[4] A, AT, and C: universali. H: universali me. L: universalissima. N: algemeene.

[5] H, AT, C, and SGZ: abducit. A: abduxit.

by any limits.[2] For obviously neither does the knowledge of one truth, like the use of one art, hinder us from discovering another, but rather does it help us in doing so. Indeed, it seems strange to me that so many human beings most carefully investigate the virtues of plants, the motions of the stars, the transmutations of metals, and the objects of similar disciplines, while, at the same time, almost no one thinks about a good mind[3] or about this universal wisdom,[4] since all other things have to be valued, after all, not so much for their own sake as because they contribute something to such a mind or to such a wisdom.[5] Hence not without merit are we proposing this rule as the first one of all, since nothing more abducts us from the right path to the truth to be sought than if we direct our studies, not toward this general end, but toward some particular ones. I am not talking about perverse and damnable ends, as are empty glory or base gain, for it is clear that specious arguments and games accommodated to the natural intelligence of the vulgar[6] open a much more direct route to these ends than could a sound knowledge of the truth. Rather, I mean even respectable and laudable ends, since these often mislead us in a more subtle way, for example, if we pursue sciences useful for the comforts of life or for that pleasure which is found in the contemplation of the truth and which is almost the only happiness in this life complete and untroubled by any pains.[7] For, to be sure, we can anticipate these legitimate fruits of the sciences; none the less, if we do think about them during our studies, then they often cause us to omit many items which are necessary for a knowledge of other things, because, at first

[2] But cf., e.g., Aristotle, *Nicomachean Ethics*, 1102 a 5 ff. (bk. I, ch. 13) and 1138 b 35 ff. (VI, 2), and *Posterior Analytics*, 74 b 5 ff. (bk. I, chs. 6–8) and 76 a 31 ff. (I, 10); Thomas Aquinas, *Summa theologica*, I–II, ques. 65, art. 1, obj. and resp. 3; etc. The prevailing ancient and medieval perspective is that psychology reflects ontology, the distinctions between faculties being based on the divisions of things. Cf. esp. Bonaventure, *De reductione artium ad theologiam*, passim.

[3] On the importance of a 'bona mens' or of 'le bon sens' cf. Descartes, *Discourse on the Method*, AT, VI, 1–2, 13, 24, and 77, as well as Cicero, *Tusculanae disputationes*, bk. V, ch. 67: 'Yet what in the human being is better than an alert and sound mind [... sagaci ac bona mente ...]?' According to Adrien Baillet, Descartes was working, in between parts of the *Rules*, namely, in 1622 and 1623, on a (lost) treatise, *Studium bonae mentis*, dealing with the states of mind that are necessary conditions for the possibility of scientific research (cf. *La vie de Monsieur Des-Cartes* [Paris, 1691/1961], vol. II, p. 406).

[4] Cf. the 'mathesis universalis' or 'universal mathematics' of R. 4, §§ 5–6.

[5] According to Aristotle, there are several dianoetical virtues, namely, (1) art or technical skill (techné), (2) scientific knowledge (epistémé), (3) prudence or practical wisdom (phronésis), (4) theoretical wisdom (sophia), and (5) intelligence or understanding (nous) – cf. *Nicomachean Ethics*, 1139 b 15 ff. (bk. VI, ch. 3 ff.). Cf. also Aquinas, *Summa theologica*, I–II, ques. 57, and the corresponding passages from his *Sententia in librum Ethicorum*. According to Descartes, the genuine philosopher – who does mathematics, knows physics, exercises good judgment, strives for wisdom, and understands how the parts of human scientific research cohere in a whole – manifests all these modes of intellectual excellence.

[6] The terms 'vulgus' (n.) and 'vulgaris' (adj.) are usually too weakly and benevolently translated with 'commonality' and 'common', respectively, for the Latin connotations are not especially flattering.

[7] On Descartes' conception of 'happiness' as intellectual 'contentement' cf. *Discourse*, AT, VI, 27–28, as well as both his Letters to Princess Elizabeth of Bohemia, AT, IV, 251–253 (Jul. 21, 1645), 263–268 (Aug. 4, 1645), 271–277 (Aug. 18, 1645), 281–287 (Sept. 1, 1645), 290–296 (Sept. 15, 1645), and 304–317 (Oct. 6, 1645), and the Letter to Queen Christina of Sweden, AT, V, 81–86 (Nov. 20, 1647). As Descartes indicates (cf. AT, IV, 252–253), his conception of happiness owes a great deal to that of the Roman Stoic philosopher Seneca (ca. 4 B.C.–A.D. 65). Cf. also Seneca's dialogue *De vita beata*.

curiosa videbuntur, omittamus. Credendumque est, ita omnes inter se esse connexas, ut longe facilius sit cunctas simul addiscere, quam unicam ab aliis separare. Si quis igitur serio rerum veritatem investigare vult, non singularem aliquam debet optare scientiam: sunt enim omnes inter se conjunctae et a se invicem dependentes; sed cogitet tantum de naturali rationis lumine augendo, non ut hanc aut illam scholae difficultatem resolvat, sed ut in singulis vitae casibus intellectus voluntati praemonstret quid sit eligendum; et brevi mirabitur se longe majores progressus fecisse,[6] quam qui ad particularia student, et non [tantum] eadem[7] omnia quae alii cupiunt, esse adeptum, sed altiora
[362] etiam quam possi[n]t[8] exspectare.[9] |

[6] H, AT, C, and SGZ: progressus fecisse. A: progressus tantum fecisse.
[7] C: non [tantum] eadem. H and A: non eadem. L: non [modo] eadem. AT: non tantum eadem. SGZ: non modo eadem.
[8] Cf. H, A, AT, C, and SGZ. N: hy zoude konnen.
[9] H, AT, C, and SGZ: exspectare. A: exspectare comperiet.

glance, these items seem either of little use or of little interest. One also has to believe that all the sciences are so interconnected that it is much easier to learn them all together than to separate one from the others. Therefore, if one seriously wants to investigate the truth of things, then one should not select some particular science, for they are all interconnected and interdependent.[8] Rather, one should simply think about increasing the natural light of reason,[9] not in order that one might solve this or that scholastic difficulty,[10] but in order that the intellect might show the will what has to be decided in the particular situations of life. Soon one will be amazed that one has made far greater progress than those who study particulars, as well as that one has achieved, not only all the things that the others desire, but also things higher than they could ever hope to expect.[11]

[8] Cf. the organic metaphor that Descartes employs in the Preface to the French Edition of the *Principles of Philosophy*, AT, IX/2, 14: 'Thus all of philosophy is like a tree [un arbre], of which the roots [les racines] are metaphysics, the trunk [le tronc] is physics, and the branches [les branches] that emerge from the trunk are all the other sciences, which may be reduced to three principal ones, to wit, medicine, mechanics, and morals ... .'
[9] Descartes claims no 'criterion of truth' other than the natural light of reason (cf. AT, II, 597–598). The systematic attempt at an analogy between the sensible light of the sun and the intelligible light of the mind goes back at least to the metaphor of the sun in Plato, *The Republic*, 506 e 1 ff. (bk. VI). Many philosophers have viewed illumination – divine or other – as a necessary condition for intelligibility, including Plotinus (203/04–269/70) – see the *Enneads* – and Augustine (354–430) – see *De magistro*.
[10] 'Scholasticism', understood as the intellectual movement that dominated medieval Western civilization, is the enormously complicated fusion of Aristotelian-Greek philosophy and Judaeo-Christian theology anticipated or undertaken by, e.g., Anselm of Canterbury (1033/34–1109), Peter Abaelard (1079–1142), Alexander of Hales (ca. 1185–1245), Bonaventure (ca. 1221–1274), Albertus Magnus (1206/07–1280), Thomas Aquinas (1225–1274), Roger Bacon (ca. 1215–ca. 1292), John Duns Scotus (ca. 1266–1308), William of Ockham (ca. 1285–1349), etc. To be sure, Descartes had been educated in the late Scholastic tradition and thus exposed to the thought of such Thomists as Thomas de Vio Cajetan (1468–1534) and Francisco Suárez (1548–1617). None the less, his chief reaction to Scholasticism would be rebellion against it. Cf. *Discourse*, AT, VI, 5, 13, 34, 37, 43, 61, and 69, where virtually all the references to Scholastic philosophy – 'la philosophie qu'on enseigne dans les écoles' – are negative.
[11] On the formation of the *ingenium* cf. esp. Quintilian, *Institutio oratoria*, I, proem, 6, 12, 26–27, i, 1, 3, ii, 16, iii, 1–17, viii, 8, x, 34, xii, 2, 8, II, iv, 7, 14, 20, viii, 1–15, IV, v, 2, V, x, 101, VI, proem, 1, 7, i, 44, ii, 3, iv, 8, VII, i, 40, VIII, proem, 2, iii, 56, X, i, 40, 50, 62, 74, 80, 90, 98, 102, 109, 115, 117, 128, 130, ii, 12, 19–20, vi, 4, vii, 22, XII, i, 9–10, 25, viii, 1, x, 10, xi, 10, 26.

Regula II

De scientia et cognitione

Circa illa tantum objecta oportet versari, ad quorum certam et indubitatam cognitionem nostra ingenia videntur sufficere.

1. Omnis scientia est cognitio certa et evidens; neque doctior est qui de multis dubitat, quam qui de iisdem nunquam cogitavit, sed nihilominus eodem videtur indoctior, si de aliquibus falsam concepit opinionem: ac proinde nunquam studere melius est, quam circa objecta adeo difficilia versari, ut vera a falsis distinguere non valentes dubia pro certis cogamur admittere, cum in illis non tanta sit spes augendi doctrinam, quantum est periculum minuendi. Atque ita per hanc propositionem rejicimus illas omnes probabiles tantum cognitiones, nec nisi perfecte cognitis, et de quibus dubitari non potest, statuimus esse credendum. Et quamvis valde paucas tales existere sibi fortasse persuadeant litterati, quia scilicet ad cognitiones tales, ut nimis faciles et unicuique obvias, communi quodam gentis humanae vitio reflectere neglexerunt: moneo tamen longe esse plures quam putant, atque tales sufficere ad innumeras propositiones certo demonstrandas, de quibus illi hactenus non nisi probabiliter disserere potuerunt; et quia[10] crediderunt indignum esse | homine litterato fateri aliquid se nescire, ita assuevere [363] commentitias suas rationes[11] adornare, ut sensim postea sibimetipsis persuaserint, atque ita illas pro veris venditarint.

2. Verum, si hanc regulam bene servemus, valde pauca occurrent, quibus addiscendis liceat incumbere. Vix enim ulla in scientiis quaestio est, de qua non saepe viri ingeniosi inter se dissenserint. Sed quotiescumque duorum de eadem re judicia in contrarias partes feruntur, certum est alterutrum saltem decipi, ac ne unus quidem videtur habere scientiam: si enim hujus ratio esset certa et evidens, ita illam alteri posset proponere, ut ejus etiam intellectum tandem convinceret. De omnibus ergo quae sunt ejusmodi probabiles opiniones, non perfectam scientiam videmur posse acquirere, quia de nobis ipsis plura sperare, quam caeteri praestiterunt, sine temeritate non licet; adeo ut, si bene calculum ponamus, solae supersint Arithmetica et Geometria ex scientiis jam inventis, ad quas hujus regulae observatio nos reducet.[12]

3. Neque tamen idcirco damnamus illam, quam caeteri hactenus invenerunt,[13] philosophandi rationem, et scholasticorum aptissima bellis probabilium syllogismorum

[10] H, AT, C, and SGZ: quia. A: qui.
[11] H, A, AT, and C: rationes. Missing in SGZ.
[12] H and SGZ: reducet. L (?), AT, and C: reducat. A: reducit.
[13] A, AT, C, and SGZ: invenerunt. H: ininerunt. L: iniverunt.

Rule Two

On Science and Knowledge

We should attend only to those objects for whose certain and indubitable cognition our natural intelligence seems to suffice.

1. All knowledge is certain and evident cognition.[12] Someone who has doubts about many things is not more learned than someone else who has never thought about them; on the contrary, one seems less learned, regardless, if one has formed a false opinion about any of them. Hence it is even better never to study than to be occupied with objects so difficult that, being unable to distinguish true things from false ones, we are forced to admit doubtful things as certain, since in these matters the danger of decreasing knowledge is greater than the hope of increasing it. Thus, in accordance with this proposition,[13] we reject all that merely probable cognition and resolve that we are to believe nothing except those things which are perfectly known and about which it is impossible to have doubt. Although the learned may perhaps persuade themselves that there are very few such things – since, owing to a certain common vice of humankind, namely, they have disdained to reflect on such truths as all too facile and obvious to everyone –, I still insist that there are many more such truths than they think, and that these truths suffice for the certain demonstration of innumerable propositions with which they have so far been able to deal only probabilistically. Because they have believed it to be unworthy of a learned human being to admit to not knowing something, they have thus grown so accustomed to elaborating upon their fabricated arguments that, in the course of time, they have gradually persuaded themselves of them and have thus passed them off as true.

2. Yet, if we do follow this rule closely, then there will indeed be very few things in the learning of which we would be permitted to get involved. For there is hardly any question in the sciences about which ingenious human beings have not often disagreed among themselves. But, whenever two people make conflicting judgments on the same issue, it is certain that at least one of them is mistaken, and not even one of them seems to have knowledge. For, if the reasoning of the one person were certain and evident, then it would be able to be laid out to the other person in such a way that eventually the former would intellectually convince the latter too. Concerning all the matters that are probable opinions of this kind, therefore, we do not seem to be able to acquire perfect knowledge, since it would be reckless for us to hope for more than others have achieved. This is so much so, that, if we are reckoning correctly, then, of the sciences already found, there would remain arithmetic and geometry alone to which the observance of this rule will reduce us.

3. Yet we do not, on this account, condemn that manner of philosophizing which others have hitherto devised, nor the weapons of the scholastics, the probable

[12] This line can also be translated thus: 'All science is certain and evident knowledge.' The point is that 'scientia' is Descartes' term for systematically organized and apodictically founded knowledge. Readers are urged to use the index of this edition to decide how to translate Descartes' epistemic terminology.
[13] Descartes often refers to the rules of the *Rules* as 'propositions' – cf., e.g., R. 5, § 2, and R. 6, § 1.

tormenta: quippe exercent puerorum ingenia, et cum quadam aemulatione promovent,
[364] quae longe melius est ejusmodi opinionibus informari, | etiamsi illas incertas esse appareat, cum inter eruditos sint controversae, quam si libera sibi ipsis relinquerentur. Fortasse enim ad praecipitia pergerent sine duce; sed quamdiu praeceptorum vestigiis insistent, licet a vero nonnunquam deflectant, certe tamen iter capessent, saltem hoc nomine magis securum, quod jam a prudentioribus fuerit probatum. Atque ipsimet gaudemus, nos etiam olim ita in scholis fuisse institutos; sed quia jam illo soluti sumus sacramento, quod ad verba Magistri nos adstringebat, et tandem aetate satis matura manum ferulae subduximus, si velimus serio nobis ipsis regulas proponere, quarum auxilio ad cognitionis humanae fastigium ascendamus, haec profecto inter primas est admittenda, quae cavet, ne otio abutamur, ut multi faciunt, quaecumque facilia sunt negligentes, et nonnisi in rebus arduis occupati, de quibus subtilissimas certe conjecturas et valde probabiles rationes ingeniose concinnant; sed post multos labores sero tandem animadvertunt, se dubiorum multitudinem tantum auxisse, nullam autem scientiam didicisse.

4. Nunc vero, quia paulo ante diximus ex disciplinis ab aliis cognitis solas Arithmeticam et Geometriam ab omni falsitatis vel incertitudinis vitio puras existere: ut diligentius rationem expendamus quare hoc ita sit, notandum est, duplici via nos ad
[365] cognitionem | rerum devenire, per experientiam scilicet, vel deductionem. Notandum insuper, experientias rerum saepe esse fallaces, deductionem vero sive illationem puram unius ab altero posse quidem omitti, si non videatur, sed nunquam male fieri ab intellectu vel minimum rationali. Et parum ad hoc prodesse mihi videntur illa Dialecticorum vincula, quibus rationem humanam regere se putant, etiamsi eadem aliis usibus aptissima

syllogisms most fitting for controversies.[14] For these do exercise the natural intelligence of the young, and they do stimulate them with a certain rivalry; also, it is much better for their natural intelligence to be informed by opinions of this kind – even if they would appear to be uncertain, since they are controversial among the learned – than that the young were left entirely to themselves. For without guidance they might perhaps head toward precipices. But, so long as they follow in the footsteps of the teachers – although they may sometimes deviate from the truth –, they will surely still hold to a path that is more secure, at least in the sense that it will have already been tested by the more prudent. To be sure, we ourselves are very glad that we too have once been thus instructed in the schools;[15] none the less, we are now freed from the oath that bound us to the master's words, and, at a mature enough age, we have finally put distance between our hands and the rod.[16] Thus, if we should seriously want to propose for ourselves rules with whose assistance we might ascend to the heights of human knowledge, then, among the first ones which we must admit, is, in fact, that which warns us that we should not abuse our leisure, as many do in that they neglect all the easy tasks and get occupied only with the difficult matters, with respect to which they, admittedly, ingeniously construct most subtle conjectures and very probable arguments, however, after many efforts, finally realize, too late, that they have only increased the multitude of their doubts, yet not acquired any knowledge.

4. But now we have said, a short while ago,[17] that, of the disciplines known by others, arithmetic and geometry alone are free from any taint of falsity or of uncertainty. In order to consider the reason for this more carefully, one has to note that there are two ways by which we arrive at a knowledge of things, namely, through experience or through deduction.[18] In addition, one has to note that, while experiences[19] of things are often deceptive, a deduction, or a pure inference of one thing from another, can be omitted, of course, if it is not seen, but it can never be performed wrongly by an even minimally rational intellect.[20] Also, those chains of the dialecticians,[21] with which they think that they regulate human reason,[22] seem to me to be of

[14] 'Probable' are those syllogisms whose premisses are believed, but not known, to be true. Aristotle's *Topics* deals with such plausible arguments and how to make them. Cf. the next paragraph on dialectical reasoning. On syllogisms generally cf. R. 7, § 5, R. 10, § 5, R. 13, § 1, and R. 14, § 2.

[15] Descartes had studied at the Jesuit *Collège Royal* of La Flèche in Anjou from 1606 to 1614 and received a *baccalauréat* and a *licence en droit* at the University of Poitiers (November 9–10, 1616).

[16] Cf. *Discourse*, pt. I, passim. [17] Cf. R. 2, § 2. [18] Cf. R. 3, § 4.

[19] The meaning of the Latin expression 'experientia', like those of many others, can vary by context. Among other things, it can mean, on the one hand, about the same in that language as in English; more technically, it can signify, on the other hand, 'induction' (here, i.e., 'inductions about things'). Yet there is a veritable definition of the verbal form 'experiri' (to [learn by] experience) in R. 12, § 19.

[20] This is a remarkable claim. Cf. R. 3, §§ 4–5 and 8, and R. 12, § 21, as well as AT, VII, 157.

[21] Here Descartes may well mean the formal rules of valid reasoning – also viewed as providing 'direction for the mind' (*directio ingenii*) – as set forth in the Scholastic logic manuals which, in accordance with the Jesuits' *Ratio studiorum* (*Order of Studies*), were standard textbooks for their schools in the late sixteenth and early seventeenth centuries. Cf., e.g., the *Introductio in dialecticam Aristotelis* (1561) of Francisco Toledo (1532–1596), the *Institutionum dialecticarum libri octo* (1564) of Pedro Fonseca (1528–1599), etc. Cf. also § 3 of this rule with its unambiguous statement of relevant first-hand knowledge.

[22] Here the Latin – 'quibus rationem humanam regere se putant' – is verbatim that of R. 10, § 4.

esse non negem. Omnis quippe deceptio, quae potest accidere hominibus, dico, non belluis, nunquam ex mala illatione contingit, sed ex eo tantum quod experimenta quaedam parum intellecta supponantur, vel judicia temere et absque fundamento statuantur.

5. Ex quibus evidenter colligitur, quare Arithmetica et Geometria caeteris disciplinis longe certiores exsistant: quia scilicet hae solae circa objectum ita purum et simplex versantur, ut nihil plane supponant, quod experientia reddiderit incertum, sed totae consistunt[14] in consequentiis rationabiliter deducendis. Sunt igitur omnium maxime[15] faciles et perspicuae, habentque objectum quale requirimus, cum in illis citra inadvertentiam falli vix humanum videatur. Neque tamen ideo mirum esse debet, si multorum

[14] H, AT, C, and SGZ: consistunt. A: insistunt.

[15] A, AT, C, and SGZ: maxime. Missing in H. Added in L.

little use here,[23] although I would not deny that they are very useful for other purposes.[24] In fact, none of the mistakes that human beings – human beings, I say, not beasts[25] – can ever make are due to faulty inference, but rather only to the fact that certain hardly understood observations[26] are taken for granted or that judgments are made rashly and groundlessly.[27]

5. From these considerations, one evidently gathers why arithmetic and geometry reveal themselves to be much more certain than any other disciplines, namely, because they alone are concerned with an object so pure and so simple that they presuppose nothing at all that experience might render uncertain, but rather consist entirely of conclusions to be deduced rationally.[28] These disciplines are, therefore, the easiest and most perspicuous of all, and they possess the kind of object that we require, since it would hardly seem human to err in them – except through inadvertence. Yet it should not be surprising, on this account, if many would, of their own accord, rather

[23] But, if Descartes is simply substituting *his* rules for *their* rules, then what is the point of the entire exercise? The decisive difference lies, neither in *whether* one follows rules – nor in *which* rules one follows –, but rather in *how* one 'follows' rules. The key is the word 'chains' (*vincula*), an expression that Descartes would hardly use to characterize his own rules – cf. R. 7, § 5, and R. 10, § 4, which, with its continuation and completion, R. 10, § 5, is crucial. On the one hand, the late Scholastic view is that it is possible to arrive at the truth reliably by 'blindly' following rules; on the other hand, the Cartesian position is that it is impossible to discover the truth reliably except by *insightfully* applying rules – which constitute method (R. 4, § 1). Thus the *Rules* involve a thematic shift of focus away from formal rules regulating extrinsic relationships between inferential contents and toward substantive rules validating intrinsic processes of inferential acts. The aim of the former is to make the life of the mind easier by permitting it to relax sometimes while at work, whereas the purpose of the latter is to make the exercise of the intelligence harder by requiring it to concentrate constantly while on duty. The fundamental epistemic issue is the distinction between necessarily evidential inference and possibly non-evidential inference.

[24] Dialectical reasoning, in the Aristotelian-Scholastic sense, is that which proceeds from opinions generally accepted though not evidentially recognized. Cf. R. 4, § 2, R. 10, §§ 4–5, and R. 13, § 1. But see also the Preface to the French edition of the *Principles*, AT, IX/2, 13: '... [one] should ... study logic, but not that of the Schools, for this logic is, strictly speaking, nothing but a dialectic which teaches the means of making understood to others the things that one already knows or even of making without judgment many speeches about things that one does not know, and thus this logic corrupts good sense rather than that it increases it.' *Discourse*, pt. II, § 6, makes similar points, some of them against Raymond Lull (ca. 1235–1316), who tries to use logic as an instrument of proselytization (cf. AT, X, 164–165). In this regard, too, Descartes distinguishes between logic and dialectic (cf. AT, V, 175).

[25] Aristotelianism and Scholasticism define the human being as 'the animal possessing speech or reason' ('zóon echón logon') and as 'the rational animal' ('animal rationale'), respectively (cf. Aristotle, *Politics*, 1253 a 7 ff. [bk. I, ch. 2], and Descartes, *Meditations on First Philosophy*, M. II, § 5). Descartes emphasizes what differentiates human beings from animals; Montaigne stresses what they have in common. Cf. *Discourse*, pt. V, § 11, and *Essais*, bk. II, ch. 12 ('An apology for Raymond Sebond'), passim.

[26] The Latin term 'experimentum' (plural: 'experimenta') has, among other meanings, both a looser and a stricter sense, i.e., it can signify both 'observation' and 'experiment' – or just 'experience'.

[27] But see R. 12, § 21.

[28] Cf. *Discourse*, pt. I, § 10: 'I delighted, above all, in mathematics, because of the certitude and the evidence of its reasonings ... .' Of the two disciplines named here, geometry emerges as rather more exemplary than arithmetic because it provides the model both for a unified vision of all human knowledge (cf. *Discourse*, AT, VI, 19) and for the mathematization of physics (cf. *Principles*, AT, VIII/1, 78–79). According to Descartes, all reasoning is modeled on mathematical reasoning (cf., e.g., AT, V, 177).

ingenia se sponte potius ad alias artes vel Philosophiam applicent: hoc enim accidit, quia confidentius sibi quisque dat divinandi licentiam in re obscura, quam in evidenti,[16]
[366] et | longe facilius est de qualibet quaestione aliquid suspicari, quam in una quantumvis facili ad ipsammet veritatem pervenire.

6. Jam vero ex his omnibus est concludendum, non quidem solas Arithmeticam et Geometriam esse addiscendas, sed tantummodo rectum veritatis iter quaerentes circa nullum objectum debere occupari, de quo non possint habere certitudinem Arithmeticis et Geometricis demonstrationibus aequalem.

Regula III

De intuitione et deductione

Circa objecta proposita non quid alii senserint, vel quid ipsi suspicemur, sed quid clare et evidenter possimus intueri, vel certo deducere quaerendum est; non aliter enim scientia acquiritur.

1. Legendi sunt Antiquorum libri, quoniam ingens beneficium est tot hominum laboribus nos uti posse: tum ut illa, quae jam olim recte inventa sunt, cognoscamus, tum etiam ut quaenam ulterius in omnibus disciplinis supersint excogitanda admoneamur. Sed interim valde periculosum est, ne quae forsitan errorum maculae, ex illorum nimis attenta lectione contractae, quantumlibet invitis et caventibus nobis adhaereant. Eo enim scriptores solent esse ingenio, ut, quoties in alicujus opinionis controversae discrimen inconsulta credulitate delapsi sunt, nos semper eodem trahere conentur subtilissi-
[367] mis argumentis; contra vero, quoties aliquid certum et evidens feliciter invenerunt, | nunquam exhibeant nisi variis ambagibus involutum, timentes scilicet ne simplicitate rationis inventi dignitas minuatur, vel quia nobis invident apertam veritatem.

2. Nunc autem, quantumvis essent omnes ingenui et aperti, nec ulla nobis unquam dubia pro veris obtruderent, sed cuncta exponerent bona fide, quia tamen vix quidquam ab uno dictum est, cujus contrarium ab aliquo alio non afferatur, semper essemus incerti, utri credendum foret. Et nihil prodesset suffragia numerare, ut illam sequeremur opinionem, quae plures habet Auctores: nam, si agatur de quaestione difficili, magis credibile est ejus veritatem a paucis inveniri potuisse, quam a multis. Sed quamvis etiam omnes inter se consentirent, non tamen sufficeret illorum doctrina: neque enim unquam, verbi gratia, Mathematici evaderemus,[17] licet omnes aliorum demonstrationes memoria teneamus, nisi simus etiam ingenio apti ad quaecumque problemata

[16] A, AT, C, and SGZ: evidenti ... in. Missing in H. L fills the lacuna with: [et facilius est de multis quaestionibus difficilibus probabiliter disserere].
[17] H, C, and SGZ: evaderemus. A and AT: evademus.

apply their natural intelligence to other arts or to philosophy. For this happens because everyone gives himself the license to guess more confidently in an obscure matter than in an evident one, and it is much easier to conjecture something about this or that question than to arrive at the truth itself about one question, however easy.

6. Yet, from all these considerations, one now has to conclude, not at all that arithmetic and geometry alone are to be studied, but rather only that those who are seeking the right path to the truth should concern themselves with no object about which they could not possess a certainty equal to the demonstrations of arithmetic and of geometry.[29]

Rule Three

On Intuition and Deduction

Concerning proposed objects, one has to investigate, not what others may have felt or what we ourselves shall conjecture, but what we can clearly and evidently intuit or certainly deduce – for knowledge is acquired in no other way.

1. Since it is a great benefit for us to be able to make use of the labors of so many human beings, we have to read the books of the ancients, both in order to learn those things which have already once been correctly discovered, and in order to be informed about those things, above and beyond these, which remain to be thought out in all the disciplines. But there is, at the same time, a great danger that, as it were, the stains of the errors contracted from these books by an all too attentive reading could stick to us, however unwilling and cautious.[30] For writers tend to possess such natural intelligence that, whenever they have erred off, through thoughtless credulity, into a decision on some controversial opinion, they always attempt, by the most subtle arguments, to drag us in that direction; whereas, on the other hand, whenever they have been lucky enough to discover something certain and evident, they never present it except as involved in various ambiguities, fearing, as it were, that the simplicity of the reasoning might diminish the importance of the finding, or because they begrudge us the plain truth.[31]

2. Now, however, even if all were frank and open, and they never tried to impose on us any doubtful matters as true, but rather put forward all things in good faith, we would still always be uncertain which of them to believe, since hardly anything is said by one the contrary of which is not asserted by another. It would be useless to count votes, in order that we might follow that opinion which more authors share.[32] For, if it is a matter of a difficult question, then it is more plausible that few rather than many have been able to discover the truth about it. But, even if they did all agree among themselves, their teaching would still not suffice. For, even though we might memorize all the demonstrations of others, we could never become mathematicians, for example, unless we were also apt, by virtue of natural intelligence, at solving any given problems;

[29] Cf. R. 9, § 4.
[30] On Descartes' view of reading cf. *Discourse*, pt. I, § 6 ff., esp. AT, VI, 5–6. Cf. also Montaigne, *Essais*, esp. bk. II, ch. 10 ('On books').
[31] Cf. R. 4, §§ 3 and 5.
[32] Cf. Terence, *Phormio*, 454: 'Quot homines, tot sententiae.'

resolvenda; vel Philosophi, si omnia Platonis et Aristotelis argumenta legerimus, de propositis autem rebus stabile judicium ferre nequeamus: ita enim, non scientias videremur didicisse, sed historias.

3. Monemur praeterea, nullas omnino conjecturas nostris de rerum veritate judiciis esse unquam admiscendas. Cujus rei animadversio non exigui est momenti: neque enim potior ratio est, quare nihil jam in vulgari Philosophia reperiatur tam evidens et certum, ut in controversiam adduci non possit, quam quia primum studiosi, res perspi-
[368] cuas et certas agnoscere non con|tenti, obscuras etiam et ignotas, quas probabilibus tantum conjecturis attingebant, ausi sunt asserere; quibus sensim postea ipsimet integram adhibentes fidem, atque illas cum veris et evidentibus permiscentes sine discrimine, nihil tandem concludere potuerunt, quod non ex aliqua ejusmodi propositione pendere videretur, ac proinde quod non esset incertum.

4. Sed ne deinceps in eundem errorem delabamur, hic recensentur omnes intellectus nostri actiones, per quas ad rerum cognitionem absque ullo deceptionis metu[18] possimus pervenire: admittunturque tantum duae, intuitus scilicet et deductio.[19]

5. Per intuitum intelligo, non fluctuantem sensuum fidem, vel male componentis imaginationis judicium fallax; sed mentis purae et attentae tam facilem distinctumque conceptum, ut de eo, quod intelligimus, nulla prorsus dubitatio relinquatur: seu, quod idem est, mentis purae et attentae non dubium conceptum, qui a sola rationis luce nascitur, et ipsamet deductione certior est, quia[20] simplicior, quam tamen etiam ab homine male fieri non posse supra notavimus. Ita unusquisque animo potest intueri, se

[18] A, AT, C, and SGZ: metu ... scilicet. Missing in H. L crosses out 'et inductio', which follows 'deceptionis', and fills the lacuna with: [periculo liceat pervenire].

[19] C and SGZ: intuitus scilicet et deductio. H, A, and AT: intuitus scilicet et inductio. N: te weten d'inzieninge en d'afleiding. N also adds in the margin: Intuitus. Deductio.

[20] A, AT, C, and SGZ: quia ... notavimus. Missing in H, which reads: quimus. L notes, but does not fill, the lacuna.

nor could we ever become philosophers, if we had read all the arguments of Plato and of Aristotle, but were unable to form a sound judgment on the matters proposed. For thus we would seem to have learned, not scientific, but historical, disciplines.

3. We are warned, in addition, never to mix any conjectures whatsoever into our judgments about the truth of things. Attention to this point is not of slight import. For the most important reason why one does not yet find, in the vulgar philosophy, anything so evident and so certain that it could not be rendered controversial is that, first, those studying it, not content to recognize perspicuous and certain things, have even dared to assert obscure and unknown ones, which they have reached by merely probable conjectures; then, gradually acquiring complete faith in these, and indiscriminately mixing them up with true and evident ones, they have, finally, been unable to draw any conclusions which would not seem to depend on some proposition of the obscure and unknown sort, and which were hence not uncertain.[33]

4. But, so that henceforth we might not fall into the same error, we here review all the actions of our intellect by means of which we could arrive at a knowledge of things without any fear of making a mistake. We recognize only two, namely, intuition and deduction.[34]

5. By 'intuition' I understand, neither the fluctuating testimony of the senses nor the deceptive judgment of an imagination which composes things badly, but rather the conceptual act of the pure and attentive mind, a conceptual act so easy and so distinct that no doubt whatsoever can remain about what we are understanding. Alternatively, it amounts to the same thing to say that by 'intuition' I understand the indubitable conceptual act of the pure and attentive mind,[35] which conceptual act springs from the light of reason alone.[36] Because this act is simpler, it is more certain, than deduction, which, however, as we have noted above,[37] a human being also cannot perform wrongly.[38] Thus everyone can mentally intuit that he exists, that he is

[33] Cf. *Discourse*, pt. I, § 12, and pt. II, § 4, for Descartes' devastatingly negative judgment on the state of philosophy in his time: 'But, having learned, in college, that one could not imagine anything so strange and so incredible that it had not been said by one of the philosophers ... .' Cf. also Montaigne, *Essais*, bk. II, ch. 12 ('An apology for Raymond Sebond'): 'Nihil tam absurde dici potest quod non dicatur ab aliquo philosophorum.' Montaigne is quoting Cicero – cf. *De divinatione*, bk. II, ch. 58, sec. 119.

[34] On the perplexing question of whether deduction is ultimately reducible to intuition cf. R. 3, §§ 5 and 8, R. 7, §§ 1 and 5, R. 9, § 1, R. 11, §§ 1–2, and R. 12, § 22. The problem is that deduction is caught between Scylla and Charybdis: On the one side, the simpler it becomes, the more certain – because the more like intuition – it becomes; on the other side, the more complex it becomes, the less certain – because the more dependent on memory – it becomes. This tension is already squarely located in §§ 5 and 8 of R. 3, the very rule that systematically lays out the distinction between intuition and deduction.

[35] Is this description of intuition as being apodictic any less remarkable than the corresponding account of deduction (cf. R. 2, § 4, R. 3, §§ 4–5 and 8, and R. 12, § 21)?

[36] Cf., e.g., AT, VII, 192 (Descartes' Response to Hobbes' Objection): '... everyone knows that by a "light in the intellect" is understood perspicuity of cognition.' But this 'light' is a metaphor which Descartes employs too extensively for evidence, the concept of which accordingly suffers. Cf. 'evidentia' and 'evidence' (and their variants) in the index and glossary of this volume, as well as *Discourse*, AT, VI, 7, 18–19, 32–33, 36, 38–40, 68, and 71, *Meditations*, AT, VII, 4, 10, 16, 25, 28–29, 32–34, 36, 49, 51, 53, 58, 61, 65, and 69–71, and *Principles*, AT, VIII/1, 8, 10, 12–13, 16, 20, 24, 26, 34, 36, and 39.

[37] Cf. R. 2, § 4.

[38] But see R. 12, § 21.

existere, se cogitare, triangulum terminari tribus lineis tantum, globum unica superficie, et similia, quae longe plura sunt quam plerique animadvertant, quoniam ad tam facilia
[369] mentem convertere dedignantur. |

6. Caeterum ne qui forte moveantur vocis intuitus novo usu, aliarumque, quas eodem modo in sequentibus cogar a vulgari significatione removere, hic generaliter admoneo, me non plane cogitare, quomodo quaeque vocabula his ultimis temporibus fuerint in scholis usurpata, quia difficillimum foret iisdem nominibus uti, et penitus diversa sentire; sed me tantum advertere, quid singula verba Latine significent, ut, quoties propria desunt, illa transferam ad meum sensum, quae mihi videntur aptissima.

7. At vero haec intuitus evidentia et certitudo, non ad solas enuntiationes, sed etiam ad quoslibet discursus requiritur. Nam, exempli gratia, sit haec consequentia: 2 et 2 efficiunt idem quod 3 et 1; non modo intuendum est 2 et 2 efficere 4, et 3 et 1 efficere quoque 4, sed insuper ex his duabus propositionibus tertiam illam necessario concludi.

8. Hinc jam dubium esse potest, quare, praeter intuitum, hic alium adjunximus cognoscendi modum, qui fit per deductionem: per quam intelligimus, illud omne quod ex quibusdam aliis certo cognitis necessario concluditur. Sed hoc ita faciendum fuit, quia

thinking,[39] that a triangle is bounded by only three lines, that a sphere is bounded by a single surface, and similar things, which are much more numerous than most might realize, since they disdain to turn their minds to such easy matters.

6. By the way, so that no one may be put off by the novel use of the term 'intuition'[40] as well as of other terms which, in the following remarks, I shall be forced, in the same manner, to remove from their vulgar signification, I here point out generally that I am not at all thinking of how each and every one of these words may have been used in the schools in the most recent times, because it would be very difficult to use the same expressions and to mean profoundly different things, but rather that I am paying attention only to what the individual words signify in Latin, so that, whenever appropriate ones are lacking, I shall transfer those to my meaning which seem to me the most apt.[41]

7. Yet this evidence[42] of and certainty of intuition is required, in fact, not only for propositional utterances, but also for any discursive arguments whatever. Take, for example, the inference that 2 plus 2 equals the same as 3 plus 1: Here one has to intuit, not only that 2 plus 2 make 4, as well as that 3 plus 1 also make 4, but also – above and beyond this – that the third proposition is a necessary conclusion from these two.[43]

8. Hence there may now be some doubt about why we have here added another mode of knowing besides intuition, which other mode comes about via deduction, by which we understand all that which one necessarily concludes from some other things known with certainty. But this had to be done thus, because very many things,

[39] Cf. *Discourse*, AT, VI, 32–33, *Meditations*, AT, VII, 24–27, *Principles*, AT, VIII/1, 6–8, etc. Thus the twin questions, first, whether intuition (*intuitus*) and deduction (*deductio*) represent two distinct species under a logical genus (which?), and, second, how both relate to inference (*illatio*), are not only leitmotifs of the *Rules*, but these issues also arise already in regard to what Descartes would later regard as his 'fundamentum certum et inconcussum' (cf. AT, VII, 12, 17–18, and 24–25), i.e., the proposition: 'Je pense, donc je suis.' ('Ego cogito, ergo sum.') Cf. furthermore AT, III, 247 f., and VII, 140.

[40] The Latin verb 'intueri' means 'to look at' or 'to gaze at' something directly, both literally, i.e., with the eyes, and metaphorically, i.e., with the mind. The usual usage is heavily weighted to the side of the literal, but Descartes shifts it decisively in favor of the metaphorical – thus the sharp distinction but alleged analogy between ocular intuition and mental intuition. Cf., e.g., R. 3, § 8, R. 7, § 5, R. 9, § 2, and R. 16, § 1.

[41] Cf. R. 13, § 5: 'Almost all philosophical controversies are about the meanings of words.'

[42] This is the first significant term used by Descartes after his 'definition of *meaning* as *use*' (cf. the previous paragraph). The Latin 'evidentia' represents the traditional translation of the Greek 'enargeia', i.e., 'distinctness' or 'intuitiveness'. 'The evident', which, in its primary and ultimate sense, is 'the self-evident', is both literally and etymologically *that which shows itself from out of itself* (*ex-videri*). On the meaning of the expression 'evidence' in the history of philosophy cf. Klaus Held, 'Evidenz', *Historisches Wörterbuch der Philosophie*, ed. J. Ritter, vol. 2 (Darmstadt, 1972), cols. 829–834. On the signification of the term in Classical rhetoric cf. Heinrich Lausberg, *Handbuch der literarischen Rhetorik. Eine Grundlegung der Literaturwissenschaft* (Munich, 1960/1973), §§ 336, 357, and esp. 810 ff., as well as Cicero, *Academica*, bk. II, ch. 17 (also *Partitiones oratoriae*, VI, 20), and Quintilian, *Institutio oratoria*, IV, ii, 63–65, VI, ii, 27–35, VIII, iii, 61–71 and 86, and IX, ii, 40. There can hardly be any more accurate measure of the shift of thematic focus which takes place between the *Rules* and the *Meditations* than that what is arguably the single most important concern in the former is not mentioned even a single time in the latter *proper*: the substantive 'evidentia'.

[43] Cf. Euclid, *The Elements*, bk. I, Common Notion no. 1: 'Things which are equal to the same thing are also equal to one another.' Cf. also R. 12, § 14.

plurimae res certo sciuntur, quamvis non ipsae sint evidentes, modo tantum a[21] veris cognitisque principiis deducantur per continuum et nullibi interruptum cogitationis motum singula perspicue intuentis: non aliter quam longae alicujus catenae extremum
[370] annulum cum primo connecti cognoscimus, etiamsi uno eodemque oculorum intuitu non omnes intermedios, a quibus dependet illa connexio, contemplemur, modo illos perlustraverimus successive, et singulos[22] proximis a primo ad ultimum adhaerere recordemur. Hic igitur mentis intuitum a deductione certa distinguimus ex eo, quod in hac[23] motus sive successio quaedam concipiatur, in illo non item; et praeterea, quia ad hanc non necessaria est praesens evidentia, qualis ad intuitum, sed potius a memoria suam certitudinem quodammodo mutuatur. Ex quibus colligitur, dici posse illas quidem propositiones, quae ex primis principiis immediate concluduntur, sub diversa consideratione, modo per intuitum, modo per deductionem cognosci; ipsa autem prima principia, per intuitum tantum; et contra remotas conclusiones, non nisi per deductionem.[24]

9. Atque hae duae viae sunt ad scientiam certissimae, neque plures ex parte ingenii debent admitti, sed aliae omnes ut suspectae erroribusque obnoxiae rejiciendae sunt; quod tamen non impedit quominus illa, quae divinitus revelata sunt, omni cognitione

[21] A, AT, C, and SGZ: a veris … interruptum. Missing in H. L fills the lacuna by adding after 'modo': [sequamur].
[22] A, AT, C, and SGZ: singulos. H: singulis.
[23] AT, C, and SGZ: hac. H and A: hoc.
[24] H, A, AT, C, and SGZ: per deductionem. N: door de afleidingen.

although they are not themselves evident, are known with certainty[44] – provided only that they are deduced from true and known principles through a continuous and uninterrupted movement of thought[45] which perspicuously intuits individuals. This is no different from how we know that the last link of a long chain is connected with the first, even if we cannot, by one and the same ocular intuition, observe all the intermediate ones on which that connection depends – provided that we have surveyed them successively, and that we remember that, from first to last, the individual links are attached to the ones next to them. Therefore, we are here distinguishing mental intuition from certain deduction on the grounds that a movement or a kind of succession is conceived in the latter, yet not in the former, and, in addition, because present evidence is not necessary for deduction, as it is for intuition, but rather does deduction, in a certain manner, get its certainty from memory.[46] From these things, one gathers that, for different considerations, those propositions which one immediately concludes from first principles can indeed be said to be known, in a way through intuition, and in a way through deduction; but the first principles themselves, only through intuition; and the remote conclusions, on the contrary, only through deduction.

9. These two ways are the most certain paths to knowledge, and, from the side of the natural intelligence, no more should be admitted, but rather should all others be rejected as suspect and liable to error. This does not, however, preclude us from

[44] How can one know with certainty things which are not themselves evident? To understand this remarkable formulation, one need only notice, for instance, a fundamental feature of both American and English jurisprudence – which Descartes the jurist also might have appreciated –, namely, that 'evidence' in the forensic sense is distinguished into *direct* evidence and *indirect* evidence: an example of the former being *eyewitness identification* and an example of the latter being *circumstantial evidence*. Cf. the definition of 'evidence' in the legal sense: *Black's Law Dictionary*, ed. H. C. Black et al. (St. Paul, 1990), p. 555 ff. (including the plethora of further references). Thus, contrary to what many might think, indirect evidence based on deduction is not necessarily inferior to direct evidence based on intuition. In fact, in some cases it may even be superior, e.g., in a case where a suspect has been convicted on the basis of a victim's eyewitness testimony only to have later to be released on the grounds that they have been excluded from involvement in the crime by means of DNA-testing. By a different type, it is also possible to prove beyond a reasonable doubt that someone has committed a crime, even though there is neither an eyewitness to it nor a confession of it. While the analogy between legal evidence and 'epistemic evidence' (*lucus a non lucendo*) may not be perfect, it is interesting that Descartes does not seem to consider the possibility that, at least in some respects, the indirect evidence of deduction can be superior to the direct evidence of intuition. By the way, the position that there is no such thing as forensic *knowledge* – pace Plato, *Theaetetus*, 200 d–201 c (cf. ibid., 172 c–177 c) – is hardly to be taken seriously, for it cannot do justice to the fact that the forum of the court also represents a playground for a perfectly legitimate *Erkenntnisspiel*.

[45] Cf. R. 7, R. 8, § 1, R. 11, R. 11, §§ 3–4, and R. 16, § 1. Such statements (as here in R. 3, § 8) are the keys to whether, according to Descartes, deduction ultimately comes down to intuition. To the extent that deduction uses 'the continuous and uninterrupted movement of thought', it becomes like intuition, and thus certain; to the extent that it does not, it becomes like memory, and thus unreliable.

[46] Cf., first, R. 7, § 1, and R. 11, § 4, where 'the continuous and uninterrupted movement of thought' is recommended as an aid to the weakness of memory; then, R. 11, §§ 1 and 3, and R. 16, § 1, where deduction seems to be a matter of intuition; and, finally, R. 11, § 2, where the idea appears to be to salvage the distinction between intuition and deduction by means of a further distinction between 'simple and perspicuous' deduction, on the one hand, and 'multifaceted and complex' deduction, on the other hand – the former occurring through intuition and the latter depending on memory. Crucial, too, is R. 7, § 5.

certiora credamus, cum illorum fides, quaecumque est de obscuris, non ingenii actio sit, sed voluntatis; et si quae in intellectu habeat[25] fundamenta, illa omnium maxime per alterutram ex viis jam dictis inveniri possint et debeant, ut aliquando fortasse fusius
[371] ostendemus. |

Regula IV

De methodo, mathematica, et mathesi universali

Necessaria est methodus ad rerum veritatem investigandam.[26]

1. Tam caeca Mortales curiositate tenentur, ut saepe per ignotas vias deducant ingenia, absque ulla sperandi ratione, sed tantummodo periculum facturi, utrum ibi jaceat quod quaerunt: veluti si quis tam stolida cupiditate arderet thesaurum inveniendi, ut perpetuo per plateas vagaretur, quaerendo utrum forte aliquem a viatore amissum reperiret. Ita student fere omnes Chymistae, Geometrae plurimi, et Philosophi non pauci; et quidem non nego illos interdum tam feliciter errare, ut aliquid veri reperiant; ideo tamen non magis industrios esse concedo, sed tantum magis fortunatos. Atqui longe satius est de nullius rei veritate quaerenda unquam cogitare, quam id facere absque methodo: certissimum enim est, per ejusmodi studia inordinata, et meditationes obscuras, naturale lumen confundi atque ingenia excaecari; et quicumque ita in tenebris ambulare assuescunt, adeo debilitant oculorum aciem, ut postea lucem apertam ferre non possint: quod etiam experientia comprobatur, cum saepissime videamus illos, qui litteris nunquam operam navarunt, longe solidius et clarius de obviis rebus judicare, quam qui perpetuo in scholis sunt versati. Per methodum autem intelligo regulas certas et faciles,
[372] quas quicumque | exacte servaverit, nihil unquam falsum pro vero supponet, et nullo mentis conatu inutiliter consumpto, sed gradatim semper augendo scientiam, perveniet ad veram cognitionem eorum omnium quorum erit capax.

2. Notanda autem hic sunt duo haec, nihil nimirum falsum pro vero supponere, et ad omnium cognitionem pervenire: quoniam, si quid ignoramus ex iis omnibus quae possumus scire, id fit tantum, vel quia nunquam advertimus viam ullam, quae nos

[25] H, A, AT, and SGZ: et si ... habeat. C: etsi ... habent. N (clause): hoewel de dingen, die hun grontvest in 't verstant hebben.

[26] H, A, AT, and C: Necessaria est methodus ad rerum veritatem investigandam. SGZ: Necessaria est methodus ad veritatem investigandam. N: Dat'er een onderwijs middel, tot d'opspeuring der waarheit noortzakelijk is. N, once again, in a marginal note to 'een': Methodus.

believing that those things which have been divinely revealed are more certain than all knowledge, since faith in these matters is – as is all belief concerning obscure things – an act, not of the natural intelligence, but of the will;[47] and, if this faith does have foundations in the intellect, then these, more than anything else, could and should be discovered by the one or the other of the ways already mentioned, as we shall perhaps show in greater detail at some point in time.[48]

Rule Four

On Method, Mathematics, and 'mathesis universalis'

A method is necessary for investigating the truth of things.

1. Mortals are possessed by such blind curiosity that they often conduct their natural intelligence along unknown paths, without any grounds for hope, but rather merely trying to find out whether what they are seeking might lie there: as if someone were consumed with such a foolish desire to discover treasure that he would perpetually roam the streets seeking whether he might perhaps find any lost by a passerby. Thus do almost all chemists, most geometers, and many philosophers engage in their studies. Therefore, to be sure, I am not denying that they sometimes err so felicitously that they find something true; none the less, I do not concede that they are more careful, but rather only more fortunate. Yet it is still far better never to think about investigating the truth of anything than to do so without a method. For it is quite certain that, by such disordered studies and obscure meditations, the natural light is confounded and the natural intelligence is blinded. Those who are accustomed to walking in the dark thus weaken their eyesight so much that afterwards they are no longer able to bear the light of day.[49] This is also confirmed by experience, for we very often see that those who have never devoted their efforts to learned studies judge much more soundly and clearly about the matters that occur to them than do those who have always been in the schools.[50] By 'a method', moreover, I understand certain and easy rules – rules such that, if one has followed them exactly, then one will never suppose anything false to be true, and, not having uselessly wasted any mental effort, but always gradually increasing knowledge, one will arrive at the true knowledge of all those things of which one will be capable.[51]

2. But here one has to note two things, namely, that one is, of course, to suppose nothing false to be true, and that one has to arrive at a knowledge of all things. For, if we do not know something of all those things which we are capable of knowing, then this happens only either because we have never noticed a way that might lead us to

[47] Cf. R, 12, § 20.

[48] This is not done in this work, but cf. *Meditations*, AT, VII, 1–6, as well as AT, III, 349–350, IV, 162 ff., V, 159, VI, 8, VII, 249 ff. and 581, VIII/1, 329, and IX/2, 5.

[49] On *obscuritas* cf. Quintilian, *Institutio oratoria*, IV, i, 40–41, ii, 44, iv, 4, v, 25–26, V, xiv, 34, VII, vi, 2–4, x, 2, VIII, ii, 12–21, iii, 50, 57, and 82, vi, 14, X, ii, 17, and XI, iii, 39.

[50] See *Discourse*, pt. I, § 14, for a remarkably similar thought.

[51] This is Descartes' definition of 'method'; there is nothing comparable to it in the *Discourse*.

duceret ad talem cognitionem, vel quia in errorem contrarium lapsi sumus. At si methodus recte explicet, quomodo mentis intuitu sit utendum, ne in errorem vero contrarium delabamur, et quomodo deductiones inveniendae sint, ut ad omnium cognitionem perveniamus: nihil aliud requiri mihi videtur, ut sit completa, cum nullam scientiam haberi posse, nisi per mentis intuitum vel deductionem, jam ante dictum sit. Neque enim etiam illa extendi potest ad docendum, quomodo hae ipsae operationes faciendae sint, quia sunt omnium simplicissimae et primae, adeo ut, nisi illis uti jam ante posset intellectus noster, nulla ipsius methodi praecepta quantumcumque facilia comprehenderet. Aliae autem mentis[27] operationes, quas harum priorum[28] auxilio diri-
[373] gere contendit Dialectica, hic sunt inutiles, vel potius inter impedimenta numerandae, quia nihil puro rationis lumini superaddi potest, quod illud aliquo modo non obscuret.

3. Cum igitur hujus methodi utilitas sit tanta, ut sine illa litteris operam dare nocitum esse videatur potius quam profuturum, facile mihi persuadeo, illam jam ante a majoribus ingeniis, vel solius naturae ductu, fuisse aliquo modo perspectam. Habet enim humana mens nescio quid divini, in quo prima cogitationum utilium semina ita jacta sunt, ut saepe, quantumvis neglecta et transversis studiis suffocata, spontaneam frugem producant. Quod experimur in facillimis scientiarum, Arithmetica et Geometria: satis enim advertimus veteres Geometras analysi quadam usos fuisse, quam ad omnium

[27] A, AT, C, and SGZ: autem mentis. H: autem [regulae circa] mentis. N (phrase): Maar d'andere werkingen des geests. AT, once again, footnotes to 'Aliae ... Dialectica': Aliae autem regulae, quarum auxilio mentis operationes dirigere se contendit Dialectica.

[28] A, AT, C, and SGZ: priorum. H: primum.

such knowledge, or because we have fallen into the opposite error.[52] But, if the method does correctly explain how we have to use mental intuition in order really to avoid falling into the opposite error,[53] as well as how we have to find the deductions in order to arrive at the knowledge of all things, then nothing else seems to me to be required in order for the method to be complete, since no knowledge is obtainable except through mental intuition or through deduction, as has already been said.[54] For one cannot also extend the method so far as to teach one how one is to perform these operations themselves, because they are the simplest of all and primary, so much so, that, unless our intellect were already able to make use of them beforehand, it would not comprehend any precepts of the method itself, however easy.[55] Yet the other mental operations, which dialectic[56] claims to direct with the help of these first ones, are useless here, or rather do they have to be reckoned as hindrances, because nothing can be added to the pure light of reason which does not obscure it in some way.

3. Therefore, since the utility of this method is so great that, without it, the pursuit of learning would seem to be more harmful than helpful, I am easily persuaded that those of greater natural intelligence have already seen it in some manner – even under the guidance of nature alone.[57] For the human mind possesses something, I know not what, of the divine, in which the first seeds of useful thoughts have been sown in such a way that, however neglected and stifled by interfering studies, they often yield spontaneous fruit.[58] We encounter this in the easiest of the sciences, to wit, in arithmetic and in geometry. For we are well aware that the ancient geometers[59] employed a kind

[52] The one error is to overlook a path to knowledge that could be taken because it is there; the other is to follow a (supposed) path to knowledge that cannot be taken because it is not (really) there. Cf. a similar train of thought about underdetermination and overdetermination of questions in R. 13, §§ 9–11.

[53] Sense-perception is not a viable path to knowledge, but this has not prevented those who do not distinguish between sensible intuition and intellectual intuition from trying to take it as such.

[54] Cf. R. 3, §§ 4–9.

[55] So much for the popular interpretation of this work as prescribing those rules of the method which must be followed in order that the operations of induction and deduction might be properly performed in the first place, or – even worse – which, if followed, would guarantee, without further ado, the achievement of the truth. For, while one may argue that the author thinks that, in order to find truth, following these rules is necessary, one can hardly argue that he thinks that doing so is sufficient. The present rule precisely does *not* say: 'Sufficiens est methodus ad rerum veritatem investigandam.'

[56] Cf. R. 2, § 4, R. 10, §§ 4–5, and R. 13, § 1.

[57] Cf. Cicero, *De legibus*, bk. I, ch. 20: 'Natura duce errare nullo modo possumus.' ('Under the guidance of nature we cannot err in any manner.') Cf. also Seneca, *De vita beata*, 8, 1.

[58] Cf. § 5 of this rule. On the notion of 'primary seeds' of truth or 'seminal reasons' cf. the tradition of the Stoic doctrine of the 'logoi spermatikoi' from Zeno of Citium (ca. 362/357–264/259) via Plotinus and Augustine to Descartes: Zeno, *Stoicorum Veterum Fragmenta* (ed. J. von Arnim [New York, 1986-Reprint]), vol. I, frags. 28, 98, and 102 (cf. also vol. II, frags. 205 and 314); Chrysippus, ibid., vol. II, frag. 1027; Origen, *Contra Celsum*, bk. I, ch. 37, and IV, 48; Plotinus, *Enneads*, III, 1, 7 (cf. also IV, 4, 9); Augustine, *De Genesi ad litteram*, bk. V, ch. 7, sec. 20, and ch. 23, sec. 45, VI, 6, 10, *De trinitate*, bk. III, ch. 9, sec. 16, and *De civitate Dei*, bk. XXII, ch. 24; etc.

[59] Cf., e.g., § 5 of this rule as well as *Meditations*, AT, VII, 4 ('... Archimedes, Apollonius, Pappus ...'). Since Latin has neither definite nor indefinite articles, Descartes may not be understood to be asserting that whoever was an ancient geometer was also a practitioner of the art of analysis.

problematum resolutionem extendebant, licet eandem posteris inviderint. Et jam viget Arithmeticae genus quoddam, quod Algebram vocant, ad id praestandum circa numeros, quod veteres circa figuras faciebant. Atque haec duo nihil aliud sunt, quam spontaneae fruges ex ingenitis hujus methodi principiis natae, quas non miror circa harum artium simplicissima objecta felicius crevisse hactenus, quam in caeteris, ubi majora illas impedimenta solent suffocare; sed ubi tamen etiam, modo summa cura excolantur, haud dubie poterunt ad perfectam maturitatem pervenire.

4. Hoc vero ego praecipue in hoc tractatu faciendum suscepi; neque enim magni facerem has regulas, si non sufficerent nisi ad inania illa problemata resolvenda, quibus Logistae vel Geometrae otiosi ludere consueverunt; sic enim me nihil aliud praestitisse
[374] crederem, quam quod fortasse subtilius nugarer quam caeteri. Et quamvis | multa de figuris et numeris hic sim dicturus, quoniam ex nullis aliis[29] disciplinis tam evidentia nec tam certa peti possunt exempla, quicumque tamen attente respexerit ad meum sensum, facile percipiet me nihil minus quam de vulgari Mathematica hic cogitare, sed quandam aliam me exponere disciplinam, cujus integumentum sint potius quam partes. Haec enim prima rationis humanae rudimenta continere, et ad veritates ex quovis subjecto eliciendas se extendere debet; atque, ut libere loquar, hanc omni alia nobis humanitus tradita cognitione potiorem, utpote aliarum omnium fontem, esse mihi persuadeo. Integumentum vero dixi, non quo hanc doctrinam tegere velim et involvere ad arcendum vulgus, sed potius ita vestire et ornare, ut humano ingenio accommodatior esse possit.

5. Cum[30] primum ad Mathematicas disciplinas animum applicui, perlegi protinus pleraque ex iis, quae ab illarum Auctoribus tradi solent, Arithmeticamque[31] et Geome-
[375] triam potissimum excolui, quia simplicissimae et | tanquam viae ad caeteras[32] esse

[29] H, AT, C, and SGZ: aliis. Missing in A. N: andere.

[30] Cf. N and A on the placement of §§ 5–6 of this rule. After § 4 H notes: vide paginâ notata litera A in fine. I.e., in H the place of the text of R. 4 from 'Cum ...' at the beginning of § 5 to '... transferre' at the end of § 6 is indicated by the letter 'A' placed at R. 21. In AT and in C this segment of text comprises the last two paragraphs of the direct commentary on R. 4. SGZ follows H.

[31] A, AT, C, and SGZ: Arithmeticamque. H: Arithmeticam vero. L: Arithmeticam vero et.

[32] A, AT, C, and SGZ: ad caeteras. N: tot d'andere dingen.

of analysis[60] which they extended to the resolution of all problems,[61] although they may have begrudged leaving it to posterity.[62] And now a certain sort of arithmetic, which one calls 'algebra',[63] is flourishing, aiming to achieve that with respect to numbers which the ancients did with respect to figures.[64] These two sciences[65] are, in fact, nothing other than the spontaneous fruits which have sprung from the innate principles of this method. I am not surprised that such fruits have hitherto grown more felicitously among the simplest objects of these arts than in the other arts, where greater obstacles tend to stifle them, but where the fruits could undoubtedly also still attain to perfect maturity, if only they were cultivated with the greatest care.

4. It is this, indeed, which I have principally undertaken to achieve in this treatise. For nor would I make much of these rules if they did suffice only to resolve those inane problems with which arithmeticians or geometers have grown accustomed to playing in order to while away their time. For I would believe myself to have achieved nothing, in that case, other than that I would perhaps be dabbling in trifles with greater subtlety than the others. Although I am going to say much about figures and about numbers here – since examples so evident and certain cannot be drawn from any other disciplines –, whoever has closely attended to my meaning will still easily perceive that here I am thinking of nothing less than of the vulgar mathematics, but rather that I am expounding quite another discipline, of which these examples are the shell rather than the parts. For this discipline should contain the primary rudiments of human reason, and it should extend to truths to be elicited in any subject whatever.[66] And, frankly speaking, I am convinced that it is more important than any other knowledge handed down to us in human fashion, since it is the source of all the rest. Yet I have spoken of a 'shell', not because I want to conceal this doctrine and to cover it up in order to protect it from the public, but rather because I want, in this manner, to clothe and to adorn it, so that it could be more accommodating to human natural intelligence.

5. When I first applied my mind to the mathematical disciplines, I at once perused most of those things which their authors tend to pass on, and I most carefully cultivated arithmetic and geometry, because these were said to be the simplest, and, as it were,

[60] Descartes distinguishes between 'the method of synthesis' and 'the method of analysis' (cf., e.g., AT, V, 153, VII, 155, 157, 159 ff., 413, etc.): The former, exemplified by formal geometrical demonstration with its ineluctable reliance on chains of definitions, postulates, axioms, theorems, and propositions, involves the deduction of conclusions from premisses, and, as such, is most appropriate to the exposition of mathematical knowledge; the latter, illustrated by the procedure of deconstructive doubt and reconstructive reflection followed by Descartes in his own 'meditations on first philosophy' or metaphysics, makes it possible for one to discover new knowledge by achieving a new beginning, based not on the accepted opinions of others, but on one's own clear and distinct perceptions of the things themselves. Once again, Descartes explicitly denies that his meditative method is new (AT, VII, 3). Of course, the best Cartesian example of *mathematical* analysis is Descartes' *Geometry* (1637).

[61] Cf. *Discourse*, pt. II, §§ 6 and 11.

[62] Cf. § 5 of this rule as well as R. 3, § 1.

[63] According to Descartes, the real power of algebra lies in its enormous potential as a methodical technique for solving problems. As such, algebra has as yet become actual only as the ancient art of analysis. On the intimate connection between ancient analysis and modern algebra cf. esp. § 5 of this rule.

[64] Cf. *Discourse*, pt. II, §§ 6 and 11–12.

[65] I.e., arithmetic and geometry (not analysis and algebra).

[66] Cf. *Discourse*, AT, VI, 19.

dicebantur. Sed in neutra scriptores, qui mihi abunde satisfacerent, tunc forte incidebant in manus: nam plurima quidem in iisdem legebam circa numeros, quae subductis rationibus vera esse experiebar; circa figuras vero, multa ipsismet oculis quodammodo exhibebant, et ex quibusdam consequentibus[33] concludebant; sed quare ista[34] ita se haberent,[35] et quomodo invenirentur, menti ipsi non satis videbantur ostendere; ideoque non mirabar, si plerique etiam ex ingeniosis et eruditis delibatas istas artes vel cito negligant ut pueriles et vanas, vel contra ab iisdem addiscendis, tanquam valde difficilibus et intricatis, in ipso limine deterreantur. Nam revera nihil inanius est, quam circa nudos numeros figurasque imaginarias ita versari, ut velle videamur in talium nugarum cognitione conquiescere, atque superficiariis istis demonstrationibus, quae casu saepius quam arte inveniuntur, et magis ad oculos imaginationemque pertineant[36] quam ad intellectum, sic incumbere, ut quodammodo ipsa ratione uti desuescamus; simulque nihil intricatius, quam tali probandi modo novas difficultates confusis numeris involutas expedire. Cum vero postea cogitarem, unde ergo fieret, ut primi olim Philosophiae inventores neminem Matheseos imperitum ad studium sapientiae vellent admittere,
[376] tanquam haec disciplina | omnium facillima et maxime necessaria videretur[37] ad ingenia capessendis aliis majoribus scientiis erudienda et praeparanda, plane suspicatus sum, quandam eos Mathesim agnovisse valde diversam a vulgari nostrae aetatis: non quod existimem eandem illos perfecte scivisse, nam eorum[38] insanae exsultationes et sacrificia pro levibus inventis aperte ostendunt, quam fuerint rudes. Nec me ab opinione dimovent quaedam illorum machinae, quae apud Historicos celebrantur: nam licet

[33] H, A, AT, C, and SGZ: consequentibus. L: consequentiis.
[34] H, C, and SGZ: ista. A and AT: haec.
[35] C: haberent. H, A, AT, and SGZ: habeant.
[36] H, C, and SGZ: pertineant. A and AT: pertinent.
[37] H, AT, C, and SGZ: videretur. A: videatur.
[38] A, AT, C, and SGZ: eorum. Missing in H.

the paths to the rest.'[67] But perhaps in neither of the two did I then encounter writers who fully satisfied me. For, to be sure, I read in them many things about numbers which, once the calculations had been carried out, I found to be true. In a certain manner, they did indeed display many things concerning figures before my very eyes, and from some of them they drew conclusions by means of inferences. None the less, why these things should be so, and how they were discovered, they did not seem to show satisfactorily to the mind itself.[68] I was not surprised, therefore, that even many of the ingenious and erudite, after having gotten interested in these arts, either would quickly neglect them as puerile and vain, or else would, at the very threshold, be deterred from learning them as very difficult and complicated. For there is really nothing more inane than so to occupy ourselves with bare numbers and with imaginary figures that we seem to want to rest content with the knowledge of such trifles, and so to get involved in those superficial demonstrations which are discovered more often through chance than through art and which pertain more to the eyes and to the imagination than to the intellect that, in a way, we break the habit of using reason itself. At the same time, there is nothing more complicated than using such a mode of proof to resolve new difficulties convoluted by confused numbers.[69] But, when I got to thinking, later on, about why it happened, therefore, that the first discoverers of philosophy once wanted to admit no one unversed in mathematics to the study of wisdom[70] – as if this discipline seemed the easiest and most indispensable of all for cultivating the natural intelligence and for preparing it to grasp other more important sciences –, I fully suspected that they had recognized a kind of mathematics quite different from the vulgar one of our own age. Not that I thought that they had had a perfect knowledge of it, for their mad exultations and sacrifices for trivial discoveries clearly show how primitive they must have been.[71] Nor am I shaken in this opinion by certain of their machines which are

[67] The prevailing perception among commentators is that this statement introduces an independent and inserted segment of text, i.e., § 5, which is predominantly of an autobiographical character and which was composed at a substantially different, and, very probably, earlier, time from the preceding paragraphs of this rule.
[68] Read in context, this statement, above all, would appear to indicate that Descartes is criticizing the ordinary mathematics for, among other things, being too synthetic, i.e., overly oriented on the exposition of the known, and thus for not being analytic enough, i.e., too little directed toward the discovery of the unknown. Cf. § 3 of this rule. In this respect, there is a remarkable parallel between Descartes' critique of contemporary mathematics and his critique of contemporary logic. Cf., e.g., R. 10, §§ 4–5.
[69] Cf., e.g., R. 16, §§ 3 and 5.
[70] According to Elias Philosophus, among others, the motto inscribed over the entrance to Plato's Academy was: 'No one ignorant of geometry may enter.' The transliterated Greek is: 'Ageómetrétos médeis eisitó.' Cf. *In Aristotelis Categorias Commentaria*, p. 118, l. 18 f., in *Commentaria in Aristotelem Graeca*, ed. A. Busse, vol. 18 (Berlin, 1900), pt. 1. It is debatable whether Descartes' substitution of 'mathematics' for 'geometry' strengthens or weakens the restriction.
[71] This is perhaps an allusion to, e.g., the alleged hecatomb of Pythagoras (ca. 582–ca. 507) on the occasion of the discovery of 'his' famous theorem (cf. Diogenes Laertius, *Collection of Lives and Opinions of the Philosophers*, bk. VIII, ch. 12); the dedicatory gift of Eratosthenes (ca. 275–ca. 195) on the occasion of the discovery of his mesolabion, an instrument for the determination of mean proportionals (cf. Pappus, *Collected Works*, bk. III, prop. 5); etc.

fortasse valde simplices exstiterint, facile potuerunt ab ignara et mirabunda multitudine ad miraculorum famam extolli. Sed mihi persuadeo, prima quaedam veritatum semina humanis ingeniis a natura insita, quae nos, quotidie tot errores diversos legendo et audiendo, in nobis extinguimus, tantas vires[39] in rudi ista et pura antiquitate habuisse, ut eodem mentis lumine, quo virtutem voluptati, honestumque utili praeferendum esse videbant, etsi, quare hoc ita esset, ignorarent, Philosophiae etiam et Matheseos veras ideas agnoverint, quamvis ipsas scientias perfecte consequi nondum possent. Et quidem hujus verae Matheseos vestigia quaedam adhuc apparere mihi videntur in Pappo et Diophanto, qui, licet non prima aetate, multis tamen saeculis ante haec tempora vixerunt. Hanc vero postea ab ipsis scriptoribus perniciosa quadam astutia[40] suppressam fuisse crediderim; nam sicut multos artifices de suis inventis fecisse compertum est, timuerunt forte, quia facillima erat et simplex, ne vulgata vilesceret, maluerintque nobis in ejus locum steriles quasdam veritates ex consequentibus acutule demonstratas,
[377] tanquam artis suae effectus, | ut illos miraremur, exhibere, quam artem ipsam docere, quae plane admirationem sustulisset. Fuerunt denique quidam ingeniosissimi viri, qui

[39] A, AT, C, and SGZ: tantas vires. H: tantos vires. L: tantos viros.
[40] H, A, AT, and C: astutia. SGZ: astutitia.

celebrated by historians.[72] For, allowing that very simple ones may perhaps have existed, they may easily have been raised to the level of marvels by the ignorant and wonder-loving multitude. But I am convinced that certain primary seeds of truths implanted by nature in human natural intelligence – seeds which we have stifled in us through our daily reading and through our hearing so many different errors – had so great powers in that primitive and pure antiquity that – by means of the same light of the mind by means of which they saw that virtue is to be preferred to pleasure, and the good, to the useful, even if they did not know why this were thus – the first discoverers also recognized the true ideas of philosophy and of mathematics, although they were not yet able to grasp these sciences perfectly.[73] To be sure, even now some traces of this true mathematics seem to me to be apparent in Pappus[74] and in Diophantus,[75] who, admittedly not of the earliest age, have still lived many centuries before these our own times. None the less, I have come to believe that this mathematics was later suppressed by these writers themselves with a kind of pernicious cunning.[76] For, as many artificers are known to have done with respect to their own inventions, they may perhaps have feared that their mathematics, because it was very easy and simple, would be depreciated if it were divulged to the commonality.[77] In lieu of it, they have preferred to show us some sterile truths cleverly demonstrated from inferences, as it were, the results of their art, in order that we might admire them, rather than to teach us this art itself, which might have completely dispelled the admiration.[78] In the present age,

[72] If 'machinae' are understood in the metaphorical sense of 'devices', then this is possibly an allusion to, e.g., the mesolabion of Eratosthenes; the conchoidal circle or curve of Nicomedes (fl. ca. 250 B.C.), by which he was able to trisect an angle and to double a cube; the *regula versatilis* of Hero(n) of Alexandria (fl. A.D. first century), which enabled him to derive the area of a triangle (cf. Pappus, *Collected Works*, bk. III); etc. On the other hand, Descartes is probably thinking of machines in the literal sense, e.g., Hero(n)'s aeolipile, which was a pneumatic instrument illustrating the force with which vapor generated by heat in a closed vessel rushes out through a narrow opening and which is thus reported to have been the first steam-powered engine. Cf., e.g., AT, I, 528; AT, IV, 224; AT, VI, 265; etc.

[73] Cf. § 3 of this rule. Cf. also *Discourse*, pt. V, § 1, and VI, 3, *Meditations*, M, III, §§ 7, 11, and 37, and AT, III, 424, on the notion of 'innate ideas' or 'laws'. On the other hand, the traditional Scholastic maxim is: 'Nihil est in intellectu, quod non fuerit prius in sensu.' I.e.: 'Nothing is in the intellect which has not first been in the senses.' Cf. Aquinas, *Quaestiones disputatae de veritate*, ques. 2, art. 3, obj. and resp. 19. In the *Discourse* the maxim is formulated thus (AT, VI, 37): '... les philosophes tiennent pour maxime, dans les écoles, qu'il n'y a rien dans l'entendement qui n'ait premièrement été dans le sens ...' Cf. also *Meditations*, M, VI, § 6: '... facile mihi persuadebam nullam [ideam] plane me habere in intellectu, quam non prius habuissem in sensu.'

[74] The Greek geometrician Pappus of Alexandria (fl. ca. A.D. 300) recorded and extended the results of his predecessors, including Euclid of Alexandria (fl. 300 B.C.) and Apollonius of Perga (fl. 247–205). The Latin edition of the extant books of his *Mathematical Collections* in 1588 helped stimulate a revival of geometry in the next century, and Pappus figures prominently in Descartes' *Geometry*, which practically begins with the latter's solution to the former's locus problem for four or more lines.

[75] The Greek algebraist Diophantus of Alexandria (fl. A.D. 250) was a pioneer in the solution of a type of indeterminate algebraic equation where one seeks integer values for the unknowns. His chief work, the *Arithmetic* (six of whose thirteen books are extant), introduces symbolism into Greek algebra.

[76] Cf. § 3 of this rule.

[77] Cf. R, 3, § 1.

[78] In other words, the ancient mathematicians themselves practiced the analytic method, but they handed down synthetic results to others – cf., once again, § 3 of this rule.

eandem hoc saeculo suscitare conati sunt: nam nihil aliud esse videtur ars illa, quam barbaro nomine Algebram vocant, si tantum multiplicibus numeris et inexplicabilibus figuris, quibus obruitur, ita possit exsolvi,[41] ut non amplius ei desit perspicuitas et facilitas summa, qualem in vera Mathesi esse debere supponimus. Quae me cogitationes cum a particularibus studiis Arithmeticae et Geometriae ad generalem quandam Matheseos investigationem revocassent, quaesivi imprimis, quidnam praecise per illud nomen omnes intelligant, et quare non modo jam dictae,[42] sed Astronomia etiam, Musica, Optica, Mechanica, aliaeque complures, Mathematicae partes dicantur. Hic enim vocis originem spectare non sufficit: nam cum Matheseos nomen idem tantum sonet quod disciplina, non minori jure, quam Geometria ipsa, [caeterae omnes][43] Mathematicae vocarentur. Atqui videmus neminem fere esse, si prima tantum scholarum limina tetigerit, qui non facile distinguat ex iis quae occurrunt, quidnam ad Mathesim pertineat, et quid ad alias disciplinas. Quod attentius consideranti tandem
[378] innotuit, illa omnia tan|tum, in quibus aliquis[44] ordo vel mensura examinatur, ad Mathesim referri, nec interesse utrum in numeris, vel figuris, vel astris, vel sonis, aliove

[41] H, AT, C, and SGZ: exsolvi. A: excoli.
[42] H, AT, C, and SGZ: dictae. A: dicta.
[43] Cf. C and SGZ, which insert: [caeterae omnes]. Cf. the corresponding footnote in AT: 'Ne manque-t-il pas ici quelque chose? Par exemple: *omnes* ou *caeterae disciplinae*?'
[44] H, C, and SGZ: aliquis. Missing in A and in AT. N: enige.

finally, there have been some very ingenious human beings who have tried to revive this art.[79] For it seems to be nothing other than that art which they call by the barbaric name 'algebra',[80] if only it could be so freed from the multiple numbers and from the inexplicable figures by which it is overwhelmed[81] that it would no longer lack that greatest perspicuity and facility which we suppose that there should be in the true mathematics.[82] Once these thoughts had recalled me from the particular studies of arithmetic and of geometry to a general investigation of mathematics, I inquired, above all, as to what precisely all understand by the term 'mathematics',[83] and as to why, not only the aforementioned arithmetic and geometry,[84] but also astronomy,[85] music,[86] optics,[87] mechanics,[88] and several other disciplines,[89] are called 'parts of mathematics'. For here it is not enough to look at the origin of the word. Namely, since the word 'mathematics' merely means the same as 'discipline',[90] all these other disciplines would have no less right to be called 'mathematics' than does geometry itself. Yet we see that there is almost no one, if he has reached even the first grades of the schools, who could not easily distinguish, among the things that occur to him, between what would pertain to mathematics and what would pertain to the other disciplines. Considering this more attentively, I realized, finally, that all those things only are referred to mathematics in which some order or measure is examined, and that it is irrelevant whether such measure were to be sought in numbers or in figures or in stars or in sounds or in any

[79] It is possible that this is an allusion to, e.g., the French mathematician François Viète (1540–1603), whose *In Artem Analyticam Isagoge* (1591), due to its revolutionary understanding of the formal, represents the first truly modern contribution to algebra. Compare and contrast the Greeks' concept of 'arithmos', i.e., 'number' intending a number of *things*, with Viète's concept of 'numerus', i.e., 'number' intending a *concept* of quantity. Cf. *Discourse*, pt. II, §§ 6–12 (AT, I, 479–480, e.g., notwithstanding). On Descartes on Viète cf. Letters to Mersenne, Dec., 1637 (?), and Jan., 1638. To Mydorge, Mar. 1, 1638. To Mersenne, Mar. 31 and Jun. 29, 1638. To Huygens, Aug. 1638. To Mersenne, Nov. 15, 1638, Feb. 20, 1639, and Aug. 30, 1640. To Unknown, Jun. 1645 (?), and To Mersenne, Nov. 2, 1646.
[80] Cf. § 3 of this rule. The Arabic is '*al-jabr*': '(the science) of reuniting' (*al* [the] + *jabr* [reunification, bone-setting]).
[81] It is possible that this is a reference to, e.g., the German mathematician and astronomer Christoph Clavius (1537–1612), whose contributions to algebra (cf., e.g., *Algebra* [1608/1609/1612]), arithmetic, and geometry had earned him the reputation of being 'the Euclid of his century' (cf., e.g., Descartes, Letter to Mersenne, Nov. 13, 1629, and AT, IV, 730–731).
[82] Descartes' own algebraic notation is, of course, still much closer to the more primitive and cluttered one of Clavius than to the more advanced and straightforward one of Viète.
[83] 'Mathematics' translates 'mathésis', which is from the Greek and means 'learning'.
[84] The list now beginning reads like a systematic anticipation of several of Descartes' own long-term research interests. Cf., e.g., *The Geometry* (1637) (AT, VI, 369–485).
[85] Cf., e.g., *Meteorology* (1637) (AT, VI, 231–366) for some thematic overlapping.
[86] Cf., e.g., *Compendium of Music* (1618) (AT, X, 89–141).
[87] Cf., e.g., *Dioptrics* (1637) (AT, VI, 81–228).
[88] Cf., e.g., Letter to Huygens, Oct. 5, 1637 ('An Explanation of the Machines by means of which a Small Force Can Be Used to Lift a Heavy Weight') (AT, I, 435–447). Also, the correspondence between Descartes and Beeckman from Jan. 24 to March 26, 1619, appears to indicate that the former may have then been working on a kind of 'treatise on mechanics'.
[89] Including considerable portions of natural philosophy – if not physics in general. Cf., e.g., *The World or The Treatise on Light* (1632–1633) (AT, XI, 3 ff.) and *Principles of Philosophy* (1644) (AT, VIII/1, 1–329).
[90] 'Discipline' translates 'disciplina', which derives from the verb 'discere', meaning 'to learn'.

quovis objecto talis mensura quaerenda sit; ac proinde generalem quandam esse debere scientiam, quae id omne explicet, quod circa ordinem et mensuram nulli speciali materiae addictam[45] quaeri potest, eandemque, non ascititio vocabulo, sed jam veterato[46] atque usu recepto, Mathesim universalem nominari, quoniam in hac continetur illud omne, propter quod aliae scientiae et Mathematicae partes appellantur. Quantum vero haec aliis sibi subditis et utilitate et facilitate antecellat, patet ex eo, quod ad eadem omnia, ad quae illae,[47] et insuper ad alia multa extendatur, difficultatesque si quas contineat, eaedem etiam in illis existant, quibus insuper et aliae insunt ex particularibus objectis, quas haec non habet. Nunc vero, cum nomen ejus omnes norint, et, circa quid versetur, etiam non attendentes, intelligant: unde fit ut[48] plerique disciplinas alias, quae ab ea dependent, laboriose perquirant, hanc autem ipsam nemo curet addiscere? Mirarer profecto, nisi scirem eam ab omnibus haberi facillimam, dudumque notavissem semper humana ingenia, praetermissis iis quae facile se putant [praestare][49] posse, protinus ad nova et grandiora festinare.

6. At ego, tenuitatis meae conscius, talem ordinem in cognitione rerum quaerenda
[379] pertinaciter observare | statui, ut semper a simplicissimis et facillimis exorsus, nunquam ad alia pergam, donec in ipsis istis[50] nihil mihi ulterius optandum superesse videatur; quapropter hanc Mathesim universalem, quantum in me fuit, hactenus excolui, adeo ut deinceps me posse existimem paulo altiores scientias non praematura diligentia tractare. Sed priusquam hinc migrem, quaecumque superioribus studiis notatu digniora percepi, in unum colligere et ordine[51] disponere conabor, tum ut ista olim, si usus exiget,[52] quando crescente aetate memoria minuitur, commode repetam ex hoc libello, tum ut jam iisdem exonerata memoria possim liberiorem animum ad caetera transferre.

[45] AT and C: addictam. H and SGZ: addictas. A: addicta.
[46] H, C, and SGZ: veterato. A and AT: inveterato.
[47] AT, C, and SGZ: illae. H and A: illa.
[48] A, AT, C, and SGZ: ut. Missing in H. Added in L.
[49] Cf. AT, C, and SGZ, which insert: [praestare].
[50] H and SGZ: in ipsis istis. A and AT: in istis. C: in istis ipsis.
[51] A, AT, C, and SGZ: ordine. L: in ordine. N: in ordening.
[52] C and SGZ: exiget. H: exipet. A and AT: exigit.

other object whatever. I also realized that, for this reason, there must be some general science which could explain all that which can be investigated concerning order and measure irrespective of any particular matter.[91] And I realized that this science should be designated, not with a far-fetched word, but by an already venerable term with a received usage, as 'mathesis universalis',[92] since it contains all that by virtue of which the other sciences are also called 'parts of mathematics'. How superior this science is to the other sciences subordinate to it, both in utility and in facility, is indeed clear from the fact that it may be extended to all those things to which they are, and, in addition, to many more, as well as from the fact that, if this science does contain difficulties, then these same ones exist in those other sciences as well, in which, due to the particular objects, there are also other difficulties, in addition, which this science does not possess. But now all know the name of this science, and, without even paying attention, can understand toward what it is directed. So how does it happen that most laboriously pursue the other disciplines which depend on it, but no one cares to learn this one itself? I would indeed be surprised at this – if I did not know that all hold it to be very easy, and if I had not realized, long ago, that human natural intelligence, having passed over things which it thinks that it can easily accomplish, always hurries on without delay to new and grander ones.

6. But, in searching for knowledge of things, I, conscious of my inadequacy, have resolved pertinaciously to observe such an order that, always starting with the simplest and easiest things, I never proceed to others until there seems to me to remain nothing further to be desired in these themselves.[93] For this reason, I have hitherto[94] cultivated this *mathesis universalis* so far as was within my power, so much so, that I should think that, in due course, I shall be able to treat of the somewhat higher sciences without premature diligence. But, before I proceed from here, I shall try to collect into a unity and to arrange in an order whatever I have thought noteworthy in previous studies: on the one hand, in order that hereafter, when the memory is diminished by increasing age, I can conveniently recall these things from this book, if use will render it necessary; and, on the other hand, in order that, the memory having already now been disburdened of these things, I might be able to devote a freer mind to the rest.

[91] Cf. R, 14, §§ 3 and 20–21 ff., R, 16, § 5, and AT, II, 70 (Descartes and Diophantus on 'order and measure').
[92] Here Descartes appears to have been inspired by the work of the Belgian mathematician Adrianus Romanus (1561–1615), e.g., *Apologia pro Archimede* (1597) and *Universae Mathesis Idea* (1602).
[93] The prevailing perception among commentators is that this statement, too, introduces an independent and inserted segment of text, i.e., § 6, which is predominantly of an autobiographical character and which was composed at a substantially different, and, very probably, earlier, time from §§ 1–4 of this rule.
[94] If one knew the precise temporal reference of this 'hactenus', then one would know a great deal more about the exact date of this entire part of the *Rules* than one does. For §§ 5–6 of this rule were very probably composed sometime during the middle of 1619 and are thus to be reckoned among the earliest parts of the text. Interestingly, these paragraphs are also the only two in the entire *Rules* to mention 'mathesis universalis'.

Regula V

De ordine et dispositione rerum

Tota methodus consistit in ordine et dispositione eorum, ad quae mentis acies est convertenda, ut aliquam veritatem inveniamus. Atqui hanc exacte servabimus, si propositiones involutas et obscuras ad simpliciores gradatim reducamus, et deinde ex omnium simplicissimarum intuitu[53] *ad aliarum omnium cognitionem per eosdem gradus ascendere tentemus.*

1. In hoc uno totius humanae industriae summa continetur, atque haec regula non
[380] minus servanda est rerum | cognitionem aggressuro, quam Thesei filum labyrinthum ingressuro. Sed multi vel non reflectunt ad id quod praecipit, vel plane ignorant, vel praesumunt se [ea][54] non indigere, et saepe adeo inordinate difficillimas quaestiones examinant, ut mihi videantur idem facere, ac si ex infima parte ad fastigium alicujus aedificii uno saltu conarentur pervenire, vel neglectis scalae gradibus, qui ad hunc usum sunt destinati, vel non animadversis. Ita faciunt omnes Astrologi, qui non cognita coelorum natura, sed ne quidem motibus perfecte observatis, sperant se illorum effectus posse designare. Ita plerique, qui Mechanicis student absque Physica, et nova ad motus ciendos instrumenta temere fabricant. Ita etiam Philosophi illi, qui neglectis experimentis veritatem ex proprio cerebro, quasi Jovis Minervam, orituram putant.

2. Et quidem illi omnes in hanc regulam peccant evidenter. Sed quia saepe ordo, qui hic desideratur, adeo obscurus est et intricatus, ut[55] qualis sit non omnes possint agnoscere, vix possunt satis cavere ne aberrent, nisi diligenter observent quae[56] in
[381] sequenti propositione exponentur. |

[53] A, AT, C, and SGZ: intuitu … tentemus. Missing in H, which reads: intemus. I: neither notices nor fills the lacuna.

[54] Cf. AT, C, and SGZ, which insert: [ea].

[55] H, AT, C, and SGZ: ut. A: et.

[56] AT, C, and SGZ: quae … exponentur. H: quae … exponetur. A: quae … exponatur.

Rule Five

On the Order and Arrangement of Things

The whole method consists in the order and arrangement of the things on which the vision of the mind has to be focused in order that we might discover any truth. And yet we shall be following this method exactly if, step by step, we reduce complicated and obscure propositions[95] *to simpler ones, and we then try to ascend, through the same steps, from the intuition of the simplest ones of all to a knowledge of all the others.*

1. This alone contains the sum of all human industry, and one who is going to pursue knowledge of things has to follow this rule no less carefully than one who is going to enter the labyrinth has to follow the thread of Theseus.[96] But many either do not reflect on what the rule prescribes, or they ignore it altogether, or they presume that they do not need it, and they frequently examine difficult questions in such a disorderly manner that they seem to me to be doing the same as if they were trying to get from the bottom of a building to the top in a single bound, having spurned or having failed to notice the steps of the stairs that have been designed for that purpose. This is how all astrologers act, who, not having gotten to know the nature of the heavens, and not even having fully observed their motions, still expect to be able to describe their effects. Thus also do most of those act who study mechanics apart from physics, and who rashly construct new instruments for producing motion.[97] So too do those philosophers act who, having neglected observations,[98] think that the truth will spring from their own brains as Minerva did from that of Jupiter.[99]

2. To be sure, all these persons are evidently violating this rule. None the less, because the order desired here is often so obscure and so complicated that not all can recognize what it is, they are hardly able to guard sufficiently against going astray, unless they carefully observe the things that will be set forth in the following proposition.

[95] Cf. R. 3, § 6, on Descartes' 'novel' terminology. In the *Rules* 'propositio' means, mainly and mostly, not a statement or judgment, but the subject-matter *proposed* for investigation. Thus Descartes distinguishes (R. 18, § 3) between 'direct' and 'indirect' propositions, e.g., 3:6 :: 6:*x* (direct) vs. 3:*x* :: *x*:12 (indirect). Although in both cases the same state of affairs is at issue, i.e., 3:6 :: 6:12, there is a significant difference in the manner in which the unknown is accessed (R. 6, §§ 7–9). Cf. R. 12, § 27.

[96] The metaphor is based on mythology. Theseus is the Athenian hero who went as one of the annual sacrificial victims to the Minotaur of king Minos of Crete. His daughter Ariadne fell in love with Theseus, and, on the condition that, if he succeeded, then he would take her back to Athens as his wife, gave him a magical ball of thread that enabled him to find and to kill her monstrous half-brother as well as to escape from the labyrinth. Theseus left Crete with Ariadne, but then he abandoned her at Naxos.

[97] Cf. R. 13, § 11.

[98] I.e., having neglected empirical or experiential evidence. Cf., e.g., R. 2, § 4.

[99] This is another metaphor rooted in mythology. Minerva, the Roman goddess of wisdom and patroness of the arts, was identified with Athene, the Greek patroness of Athens and goddess of philosophy. Also the goddess of martial prowess, Minerva had allegedly sprung fully armed from the head of Jupiter.

Regula VI

De naturis simplicibus et respectibus involutis

Ad res simplicissimas ab involutis distinguendas et ordine persequendas, oportet in unaquaque rerum serie, in qua aliquot veritates unas ex[57] *aliis directe deduximus, observare quid sit maxime simplex, et quomodo ab hoc caetera omnia magis, vel minus, vel aequaliter removeantur.*

1. Etsi nihil valde novum haec propositio docere videatur, praecipuum tamen continet artis secretum, nec ulla utilior est in toto hoc tractatu: monet enim res omnes per quasdam series posse disponi, non quidem in quantum ad aliquod genus entis referuntur, sicut illas[58] Philosophi in categorias suas diviserunt, sed in quantum unae ex aliis cognosci possunt, ita ut, quoties aliqua difficultas occurrat,[59] statim advertere possimus, utrum profuturum sit aliquas alias prius, et quasnam, et quo ordine perlustrare.

2. Ut autem id recte fieri possit, notandum est primo, res omnes, eo sensu quo ad nostrum propositum utiles esse possunt, ubi non illarum naturas solitarias spectamus, sed illas inter se comparamus, ut unae ex aliis cognoscantur, dici posse vel absolutas vel respectivas.

3. Absolutum voco, quidquid in se continet naturam puram et simplicem, de qua est quaestio: ut omne id quod consideratur quasi independens, causa, simplex, universale, unum, aequale, simile, rectum, vel alia hujusmodi; atque idem primum voco simplicissimum | et facillimum, ut illo utamur in quaestionibus resolvendis. [382]

4. Respectivum vero est, quod eandem quidem naturam, vel saltem aliquid ex ea participat, secundum quod ad absolutum potest referri, et per quandam seriem ab eo deduci; sed insuper alia quaedam in suo conceptu involvit, quae respectus appello: tale est quidquid dicitur dependens, effectus, compositum, particulare, multa, inaequale, dissimile, obliquum, etc. Quae respectiva eo magis ab absolutis removentur, quo plures ejusmodi respectus sibi invicem subordinatos continent; quos omnes distinguendos esse monemur in hac regula, et mutuum illorum inter se nexum naturalemque ordinem ita esse observandum, ut ab ultimo ad id, quod est maxime absolutum, possimus pervenire per alios omnes transeundo.

5. Atque in hoc totius artis secretum consistit, ut in omnibus illud maxime absolutum diligenter advertamus. Quaedam enim sub una quidem consideratione magis

[57] AT, C, and SGZ: veritates unas ex. H: veritates unae ex. A: veritates ex.
[58] H, A, AT, and C: illas. SGZ: sicut Philosophi.
[59] H, C, and SGZ: occurrat. A and AT: occurrit.

Rule Six

On Simple Natures and Complex Relations

In order to distinguish the simplest things from the complicated ones and to pursue the former in an orderly manner, we should observe, in each and every series of things in which we have directly deduced some truths from others, which is the most simple and how all the others are more or less or equally removed from it.

1. Although this proposition may not seem to teach anything very novel, it still contains the principal secret of the art,[100] and there is no more useful proposition in this entire treatise. For it advises that all things can be arranged in certain series, not, of course, in so far as they are referred to some genus of being – as the philosophers have divided things into their categories[101] –, but, still, in so far as some can be known from others,[102] in such a way that, whenever a difficulty should arise, we could immediately notice whether it is worthwhile to examine any others first, and, if so, which ones and in which order.

2. But, in order to be able to do this correctly, one has to note, first, that all things, in the sense in which they can be useful to what we have proposed – where we are not looking at their isolated natures, but comparing them with one another,[103] so that some may be known from others –, can be said to be either 'absolute' or 'relative'.

3. I call 'absolute' whatever contains within itself the pure and simple nature[104] in question, such as all that which is considered, as it were, as independent, a cause, simple, universal, one, equal, similar, straight, or other things of this kind; and, in addition, I call 'absolute' the simplest and easiest thing of all, in order that we might make use of it in resolving questions.

4. The 'relative', on the other hand, is, to be sure, what participates in the same nature, or in something of it, at least, by virtue of which it can be referred to the absolute and deduced from it in a certain series of steps. The concept of the 'relative' involves, none the less, other things, in addition, which I call 'relations'. Such is whatever is said to be dependent, an effect, composite, particular, many, unequal, dissimilar, oblique, et cetera. The further such relative things are removed from absolute things, the more mutually subordinate relations of this kind do they contain. In this rule, we are advised that all these relations have to be distinguished, and that the interconnections between them as well as their natural order have to be observed in such a way that from the last thing we should be able to reach that which is most absolute by passing through all the others.

5. The secret of the entire art[105] consists in the fact that in all things we should pay careful attention to that which is most absolute. For, from one point of view, some

[100] I.e., of the method. Cf. § 5 of this rule.
[101] Cf., e.g., Aristotle, *On the Categories*, 1 b 25 ff. (ch. 4), where the categories are given as: substance, quantity, quality, relation, location, time, position, possession, action, and passion.
[102] Cf. R. 1, § 1, and *Discourse*, pt. II, § 11.
[103] Cf. R. 14, § 2.
[104] This is the first mention of a 'simple nature' in the *Rules*. Cf. § 6 of this rule as well as R. 8, § 10, and R. 12, §§ 12–16 (esp. 13 with its several examples of 'simple things'), 18, and 22–24.
[105] Cf. § 1 of this rule.

absoluta sunt quam alia, sed aliter spectata sunt magis respectiva: ut universale magis quidem absolutum est quam particulare, quia naturam habet magis simplicem, sed eodem[60] dici potest magis respectivum, quia ab individuis dependet ut existat, etc. Item quaedam interdum sunt vere magis absoluta quam alia, sed nondum tamen[61] omnium maxime: ut si respicianus individua, species est quid absolutum; si genus, est quid respectivum; inter mensurabilia, extensio est quid absolutum, sed inter extensiones
[383] longi|tudo,[62] etc. Item denique, ut melius intelligatur nos hic rerum cognoscendarum series, non uniuscujusque naturam spectare, de industria causam et aequale inter absoluta numeravimus, quamvis eorum natura vere sit respectiva: nam apud Philosophos quidem causa et effectus sunt correlativa; hic vero si quaeramus qualis sit effectus, oportet prius causam agnoscere,[63] et non contra. Aequalia etiam sibi invicem correspondent, sed quae inaequalia sunt, non agnoscimus nisi per comparationem ad aequalia, et non contra, etc.

6. Notandum secundo paucas esse duntaxat naturas puras et simplices, quas primo et per se, non dependenter ab aliis ullis, sed vel in ipsis experimentis, vel lumine quodam in nobis insito, licet intueri; atque has dicimus diligenter esse observandas: sunt enim eaedem, quas in unaquaque serie maxime simplices appellamus. Caeterae autem omnes non aliter percipi possunt, quam si ex istis deducantur,[64] idque vel immediate et proxime, vel non nisi per duas aut tres aut plures conclusiones diversas; quarum numerus etiam est notandus, ut[65] agnoscamus utrum illae a prima et maxime simplici propositione pluribus vel paucioribus gradibus removeantur. Atque talis est ubique consequentiarum contextus, ex quo nascuntur illae rerum quaerendarum series, ad quas
[384] omnis quaestio est reducenda, ut certa methodo possit examinari. Quia vero non | facile est cunctas recensere, et praeterea, quia non tam memoria retinendae sunt, quam acumine quodam ingenii dignoscendae, quaerendum est aliquid ad ingenia ita formanda, ut illas, quoties opus erit, statim animadvertant; ad quod profecto nihil aptius esse sum expertus, quam si assuescamus ad minima quaeque ex iis, quae jam ante percepimus, cum quadam sagacitate reflectere.

[60] H, A, AT, C, and SGZ: eodem. L: idem.
[61] H, A, AT, and C: sed nondum tamen. SGZ: nondum tamen.
[62] H, A, AT, C, and SGZ: longitudo. L: longitudo [est quid respectivum].
[63] H, C, and SGZ: agnoscere. A and AT: cognoscere.
[64] H, AT, C, and SGZ: deducantur. A: deducuntur.
[65] A, AT, C, and SGZ: ut … pluribus. Missing in H. L replaces 'ut … pluribus' with: [utrum pluribus].

things are indeed more absolute than others, yet, from a different point of view, they are more relative,[106] just as the universal is indeed more absolute than the particular, because it has a simpler nature, yet it can be called more relative than it, because it depends on individuals in order to exist, et cetera. Once again, some things are sometimes really more absolute than others, yet they are still not the most absolute of all. Thus, if we are considering individuals, then the species is something absolute, but, if we are considering the genus, then the species is something relative; among things measurable, extension is something absolute, but, among extensions, length is, et cetera. Finally, once again, in order that one better understand that here we are contemplating the series of things to be known and not the nature of each and every one of them, we have deliberately reckoned 'cause' and 'equal' among the absolutes, although their nature is really relative. For, among philosophers, cause and effect are, of course, correlatives. Here, on the other hand, if we inquire as to what the effect is, then we should first recognize the cause, and not vice versa. Equals also mutually correspond to one another, but we can recognize which things are unequal only by comparison with equals, and not vice versa, et cetera.

6. One has to note, second, that there are only a few pure and simple natures which can be intuited first off and per se, independently of any others, but rather either in experiences themselves or by means of some light situated in us.[107] We are saying, in addition, that we have to observe these natures carefully, for they are, in each series, those which we call 'the most simple'. But all the other natures we can perceive only by deducing them from those most simple, and this, either immediately and proximally, or by means of two or three or more different inferences. The number of these inferences also has to be noted, in order that we may recognize whether the conclusions are removed from the primary and most simple proposition by more steps or by fewer. The chain of inferences, out of which arise those series of things to be investigated to which every question has to be reduced, is everywhere such that one could examine it by means of a certain method. Yet, since it is not easy to review all the inferences together, and, moreover, since they have not so much to be retained by the memory as to be distinguished by the acumen of the natural intelligence, as it were, one has to seek something for forming the natural intelligence in such a way that it might immediately notice them whenever there is need. It has been my experience, in fact, that there is no better way of doing this than by accustoming ourselves to reflecting, with a certain sagacity,[108] on the minute aspects of those things which we have already perceived.

[106] The following cases assume familiarity with the *arbor Porphyriana*, a kind of logical scaffold for explicating the relationships between the five predicables, i.e., genus, species, difference, property, and accident, which function as the traditional elements of definition. E.g., 'the human being' (species) is 'a rational (difference) sentient being (genus)' that is 'risible' (property) and 'pedestrian as well as biped' (accident). Cf. Porphyry (232/33–304), *Isagoge to the Categories of Aristotle*, passim. The 'tree of Porphyry' was very popular among the Scholastics, and the *Isagoge* provides the locus classicus for the question about the status of universals, perhaps the one most dominant topic of Scholastic philosophy (cf. 1 a 8–13). Cf. Descartes, *Principles*, pt. I, §§ 59–62, and AT, VII, 140 and 506, as well as AT, X, 516.

[107] Cf. R, 12, § 14.

[108] Cf. R, 10, esp. § 2.

7. Notandum denique tertio est, studiorum initia non esse facienda a rerum difficilium investigatione; sed, antequam ad determinatas aliquas quaestiones nos accingamus, prius oportere absque ullo delectu colligere sponte obvias veritates, et sensim postea videre, utrum aliquae aliae ex istis deduci possint, et rursum aliae ex his, atque ita consequenter. Quo deinde facto, attente reflectendum est ad inventas veritates, cogitandumque diligenter, quare unas aliis prius et facilius potuerimus reperire, et quaenam illae sint; ut[66] inde etiam judicemus, quando aliquam determinatam quaestionem aggrediemur, quibusnam aliis inveniendis juvet prius incumbere. Ex. gr., si[67] occurrerit mihi, numerum 6 esse duplum ternarii, quaesiverim deinde senarii duplum, nempe 12; quaesiverim iterum, si lubet, hujus duplum, nempe 24, et hujus, nempe 48, etc.; atque inde deduxerim, ut facile fit, eandem esse proportionem inter 3 et 6, quae est inter 6 et 12, item inter 12 et 24, etc., ac proinde numeros 3, 6, 12, 24, 48, etc., esse continue proportionales. Inde profecto, quamvis haec omnia tam perspicua sint, ut propemodum
[385] puerilia videantur, attente reflectendo intelligo, | qua ratione omnes quaestiones, quae circa proportiones sive habitudines rerum proponi possunt, involvantur, et quo ordine debeant quaeri: quod unum totius scientiae pure[68] Mathematicae summam complectitur.

8. Primum enim animadverto,[69] non difficilius inventum fuisse duplum senarii, quam duplum ternarii; atque pariter in omnibus, inventa proportione inter duas quascumque magnitudines, dari posse alias[70] innumeras, quae eandem inter se habeant[71] proportionem; nec mutari naturam difficultatis, si quaerantur tres, sive quatuor, sive plures ejusmodi, quia scilicet singulae seorsim et nulla habita ratione ad caeteras sunt inveniendae. Adverto deinde, quamvis, datis magnitudinibus 3 et 6, facile invenerim[72] tertiam in continua proportione, nempe 12, non tamen aeque facile datis duabus extremis, nempe 3 et 12, posse mediam inveniri, nempe 6; cujus rei rationem intuenti patet, hic esse aliud difficultatis genus a praecedenti plane diversum: quia, ut medium proportionale inveniatur, oportet simul attendere ad duo extrema et ad proportionem, quae est inter eadem duo, ut nova quaedam ex ejus divisione habeatur; quod valde diversum est ab eo, quod datis duabus magnitudinibus requiritur ad tertiam in continua proportione inveniendam. Pergo etiam et examino, datis magnitudinibus 3 et[73] 24, utrum
[386] aeque facile una ex duabus mediis proportionalibus, nempe 6 et | 12, potuisset[74] inveniri; hicque adhuc aliud difficultatis genus occurrit, prioribus magis involutum: quippe hic, non ad unum tantum vel ad duo, sed ad tria diversa simul est attendendum,

[66] H, AT, C, and SGZ: ut. A: et.
[67] H (?), L, AT, C, and SGZ: si. Missing in A.
[68] H, C, and SGZ: pure. A and AT: purae.
[69] H, C, and SGZ: animadverto. A and AT: adverto.
[70] H, A, AT, and C: alias. Missing in SGZ.
[71] H, C, and SGZ: habeant. A and AT: habent.
[72] A, C, and SGZ: invenerim. H and AT: inveneris. N: heb gevonden.
[73] A, AT, C, and SGZ: 3 et ... nempe. Missing in H. L: [3 et 24 quomodo duae mediae proportionales].
[74] H, A, AT, C, and SGZ: potuisset. L: potuissent.

7. Finally, one has to note, third, that we are not to begin studies with the investigation of difficult matters. Rather, before we get ready to go up against any specific questions, we should first collect, without any selectivity, those truths at hand of themselves, and then gradually see whether we could deduce some others from them, and still others from these, and so on in logical sequence. Once this has been done, we then have to reflect attentively on the truths discovered and to think carefully about why we were able to find some of them earlier and more easily than others, and which ones these were, in order that, on the basis thereof, we might also judge which things it might help to focus on discovering first when we shall attack some specific question. For example, if it occurs to me that the number 6 is twice the number 3, then I may ask what twice the number 6 is, namely, 12. Once again, I may, if I like, ask what twice 12 is, namely, 24, and what twice 24 is, namely, 48, et cetera. From there, I may deduce, as is easily done, that there is the same proportion between 3 and 6 which there is between 6 and 12, and, once again, between 12 and 24, et cetera, and hence that the numbers 3, 6, 12, 24, 48, et cetera, are continued proportionals. Although all these things are so perspicuous that they might seem almost childish, it is, in fact, on the basis thereof that, by reflecting carefully, I understand what rational aspect is involved in all those questions which can be posed about the proportions or relations of things, and in what order they should be investigated.[109] This one thing encompasses the sum of the entire science of pure mathematics.[110]

8. For I realize, first,[111] that it was no more difficult to discover what twice the number 6 is than twice the number 3; and that, equally in all cases, once a proportion between any two magnitudes has been found, innumerable other magnitudes can also be found which have the same proportion between them; and that the nature of the difficulty does not change if three or four or more of this sort are being sought, namely, because they have to be found as individuals, separately and without having had any relation to the others. I realize, next, that, although, given the magnitudes 3 and 6, I easily found a third magnitude in continued proportion, namely, 12, still, the two extreme terms, namely, 3 and 12, having been given, it was not equally easy to find the mean proportional, namely, 6. The reason for this – as is obvious to one who is intuiting – is that here there is an entirely different kind of difficulty from the preceding one. For, in order to find the mean proportional, one must attend, at the same time, to the two extreme terms and to the proportion between these two, in order to obtain a new proportion from the division of this one.[112] This is very different from the case in which two magnitudes have been given and one is required to find the third one in continued proportion.[113] I also continue and examine whether, had the magnitudes 3 and 24 been given, it would have been equally easy to find one of the two mean proportionals, namely, 6 and 12. And here occurs, once again, yet another kind of difficulty, one even more complicated than the preceding ones, since here one has to attend, of course, not just to one thing or to two things, but to three different ones, at

[109] Cf. *Discourse*, pt. II, § 11.
[110] Cf., e.g., R. 13 ff., where the project is the representation of algebra by means of geometry.
[111] Cf. R. 11, § 5.
[112] The task here is to find an x such that $3{:}x :: x{:}12$.
[113] The task here is to find an x such that $3{:}6 :: 6{:}x$.

ut quartum[75] inveniatur. Licet adhuc ulterius progredi, et videre utrum, datis tantum 3 et 48, difficilius adhuc fuisset unum ex tribus mediis proportionalibus, nempe 6, 12 et 24, invenire; quod quidem ita videtur prima fronte. Sed statim postea occurrit, hanc difficultatem dividi posse et minui: si scilicet primo quaeratur unicum tantum medium proportionale inter[76] 3 et 48, nempe 12; et postea quaeratur aliud medium proportionale inter 3 et 12, nempe 6, et aliud inter 12 et 48, nempe 24; atque ita ad secundum difficultatis genus ante expositum reduci.

9. Ex quibus omnibus insuper animadverto, quomodo per diversas vias ejusdem rei cognitio quaeri possit, quarum una alia sit longe difficilior et obscurior. Ut ad invenienda haec quatuor continue proportionalia, 3, 6, 12, 24, si ex his supponantur duo consequenter, nempe 3 et 6, vel 6 et 12, vel 12 et 24, ut ex illis reliqua inveniantur, res erit factu facillima; tuncque propositionem inveniendam directe examinari dicemus. Si vero supponantur duo alternatim, nempe 3 et 12, vel 6 et 24, ut reliqua inde inveniantur, tunc difficultatem dicemus examinari indirecte primo modo. Si item supponantur duo extrema, nempe 3 et 24, ut ex his intermedia[77] 6 et 12 quaerantur, tunc examina-
[387] bitur ¡ indirecte secundo modo. Et ita ulterius pergere possem, atque alia multa ex hoc uno exemplo deducere; sed ista sufficient,[78] ut lector animadvertat quid velim, cum propositionem aliquam directe deduci dico, vel indirecte, et putet, ex facillimis quibusque et primis rebus cognitis, multa in aliis etiam disciplinis ab attente reflectentibus et sagaciter disquirentibus posse inveniri.

Regula VII

De enumeratione sive inductione

Ad scientiae complementum oportet omnia et singula, quae ad institutum nostrum pertinent, continuo et nullibi interrupto cogitationis motu perlustrare, atque illa sufficienti et ordinata enumeratione complecti.

1. Eorum, quae hic proponuntur, observatio necessaria est ad illas veritates inter certas admittendas, quas supra diximus a primis et per se notis principiis non immediate deduci. Hoc enim fit interdum per tam longum consequentiarum contextum, ut, cum ad illas[79] devenimus, non facile recordemur totius itineris, quod nos eo usque perduxit; ideoque memoriae infirmitati continuo quodam cogitationis motu succurrendum esse

[75] H, A, AT, C, and SGZ: quartum. L: [quaesitum]. N: het vierde.
[76] A, AT, and C: inter ... proportionale. Missing in H, L and SGZ: inter 3 et 48, nempe 12, deinde medium proportionale.
[77] A, AT, C, and SGZ: intermedia. H: intermediae.
[78] A, AT, C and SGZ: sufficient. H: sufficiant.
[79] H, AT, C, and SGZ: illas. A: illa.

the same time, in order to find a fourth.[114] One can go further still and see whether, given just 3 and 48, it would have been even more difficult to find one of the three mean proportionals, namely, 6, 12, and 24. At first sight, this does, to be sure, seem thus. It then immediately occurs to us, none the less, that we can divide and diminish this difficulty, namely, if we seek, first, only the single mean proportional between 3 and 48, namely, 12, and, then, another mean proportional between 3 and 12, namely, 6, and, finally, another between 12 and 48, namely, 24 – and thus that we can reduce this difficulty to the second kind of difficulty described above.

9. Moreover, I realize, from all these examples, how we can pursue knowledge of the same thing along different paths, one of which is much more difficult and obscure than the other. For example, if, in order that these four continued proportionals, namely, 3, 6, 12, and 24, may be found, any two of them in sequence, namely, 3 and 6, or 6 and 12, or 12 and 24, are presupposed as given, in order that the rest of them may be found, then the matter will be taken care of very easily. In this case, we shall say that the proposition to be discovered is being 'directly examined'. On the other hand, if two alternates, namely, 3 and 12, or 6 and 24, are presupposed as given, in order that the rest may be found from there, then we shall say that the difficulty is being 'indirectly examined by means of the first mode'. Likewise, if the two extreme numbers, namely, 3 and 24, are presupposed as given, in order that the intermediates, 6 and 12, may be sought from them, then it will be 'indirectly examined by means of the second mode'. Now I could go on even further in this manner and deduce many other things from this one example. But these will suffice to get the reader to note what I mean when I say that some proposition is deduced 'directly' or 'indirectly', and to get the reader to believe that, from each of the easiest and primary things known, those who reflect attentively and discriminate sagaciously can discover many things, even in other disciplines.

Rule Seven

On Enumeration or Induction

For the completion of knowledge, we should survey, in a continuous and completely uninterrupted movement of thought,[115] all the things that relate to our project, together and individually, and we should also summarize them in a sufficient and orderly enumeration.

1. It is necessary to observe the things proposed here in order to admit as certain those truths which, as we have said above,[116] are not immediately deduced from the principles primary and known per se. For this deduction sometimes occurs through such a long chain of inferences that, when we have arrived at these truths, it is not easy for us to recall the entire itinerary which has led us to them. For this reason, we are saying that a certain continuous movement of thought must assist the weakness of

[114] The task here is to find an x and a y such that $3{:}x :: x{:}y :: y{:}24$.
[115] Cf. R. 3, § 8, R. 7, § 1, R. 11, R. 11, §§ 3–4, and R. 16, § 1.
[116] Cf. R. 3, § 8, and R. 6, § 6.

dicimus. Si igitur, ex. gr., per diversas operationes cognoverim primo, qualis sit habitudo inter magnitudines A et B, deinde inter B et C, tum inter C et D, ac denique
[388] inter D et E: non idcirco video qualis sit inter | A et E, nec possum intelligere praecise ex jam cognitis, nisi omnium recorder. Quamobrem illas continuo quodam cogitationis motu[80] singula intuentis simul et ad alia transeuntis aliquoties percurram, donec a prima ad ultimam tam celeriter transire didicerim, ut fere nullas memoriae partes relinquendo, rem totam simul videar intueri; hoc enim pacto, dum memoriae subvenitur, ingenii etiam tarditas emendatur, ejusque capacitas quadam ratione extenditur.

2. Addimus autem, nullibi interruptum debere esse hunc motum; frequenter enim illi, qui nimis celeriter et ex remotis principiis aliquid deducere conantur, non omnem conclusionum intermediarum catenationem tam accurate percurrunt, quin multa inconsiderate transiliant. At certe, ubi vel minimum quid est praetermissum, statim catena rupta est, et tota conclusionis labitur certitudo.

3. Hic praeterea enumerationem requiri dicimus ad scientiae complementum: quoniam alia praecepta juvant quidem ad plurimas quaestiones resolvendas, sed solius enumerationis auxilio fieri potest, ut ad quamcumque animum applicemus, de illa semper feramus judicium verum et certum, ac proinde nihil nos plane effugiat, sed de cunctis aliquid scire videamur.

4. Est igitur haec[81] enumeratio, sive inductio, eorum omnium, quae ad propositam aliquam quaestionem spectant, tam diligens et accurata perquisitio, ut ex illa certo evidenterque concludamus, nihil a nobis perperam fuisse praetermissum: adeo ut, quoties
[389] illa fuerimus | usi, si res petita nos lateat, saltem in hoc simus doctiores, quod certo percipianus, illam nulla via a nobis cognita potuisse inveniri; et si forte, ut saepe continget, vias omnes, quae ad illam hominibus patent, potuerimus perlustrare, liceat audacter asserere, supra omnem humani ingenii captum positam esse ejus cognitionem.

5. Notandum praeterea, per sufficientem enumerationem sive inductionem, nos illam tantum intelligere, ex qua veritas certius concluditur, quam per omne aliud probandi genus praeter simplicem intuitum; ad quem quoties aliqua cognitio non

[80] C: cogitationis motu. H, A, AT, and SGZ: imaginationis motu. N: beweeging van denking. Cf. R. 3, § 8, R. 7, R. 7, § 1, R. 11, R. 11, §§ 3–4, and R. 16, § 1. Hence a reference to the 'motus imaginationis' would be unique and therefore improbable.

[81] AT and SGZ: haec. A, H, and C: hic.

memory.[117] Therefore, for example, if, by means of different operations, I have come to know, first, what the relation between the magnitudes A and B is, and, then, between B and C, and, next, between C and D, and, finally, between D and E, then I do not, without further ado, see what the relation is between A and E, nor can I understand what that relation is just from those relations already known, unless I recall all of them. For this reason, I shall run through these relations several times, in a certain continuous movement of thought, simultaneously intuiting individual ones and passing on to the others, until I have learned to pass from the first to the last so swiftly that, leaving room for almost no functions of the memory,[118] I seem to intuit the whole thing at once.[119] For, in that the memory is relieved in this fashion, the sluggishness of the natural intelligence is also emended, and, in a certain manner, the capacity of this intelligence is extended.[120]

2. We add, however, that this movement must nowhere be interrupted. For those who attempt to deduce something too swiftly and from remote principles frequently do not run through the entire chain of intermediate inferences very accurately, so that they pass over many things without due consideration. But, whenever even the smallest thing is overlooked, surely the chain is immediately broken and the entire certainty of the conclusion collapses.

3. Here we are saying, furthermore, that enumeration is required for the completion of knowledge. For, to be sure, the other precepts do help to resolve most questions; none the less, only with the aid of enumeration are we always able to make a true and certain judgment about whatever question it is to which we may be applying the mind, and only with the aid of enumeration, therefore, does nothing completely escape us, but rather are we seen to know something about all things together.

4. This enumeration, or induction, is, therefore, a thorough inquiry into all those things which relate to some proposed question, a thorough inquiry so careful and so accurate that we may certainly and evidently conclude from it that we have not inadvertently overlooked anything: so much so, that, whenever we have made use of it, even though the thing sought eludes us, we are more learned – in the respect, at least, that we perceive with certainty that it could not have been discovered by any path known to us. If we have perhaps been able to survey all the paths to the thing sought which are accessible to human beings, as often happens, then one may boldly assert[121] that knowledge of it lies completely beyond the grasp of human natural intelligence.

5. One has to note, moreover, that by 'sufficient enumeration' or 'induction' we mean just that enumeration or induction from which the truth is concluded more certainly than from any other kind of proof except simple intuition. Whenever some

[117] The 'infirmitas memoriae' is a constantly recurring theme in the *Rules*. Cf. R. 3, § 8, R. 4, § 6, and R. 11, § 4. For a critical analysis of the view that memory records things like a kind of 'videotape', albeit in a context rather different from any that Descartes might have in mind, see Frederick Crews (and his critics), *The Memory Wars: Freud's Legacy in Dispute* (New York, 1995), passim. According to empirical investigations, 'memory is inherently sketchy, reconstructive, and unlocalizable' (ibid., p. 164). It also 'decays drastically over time' (ibid.) and 'is easily corrupted' (ibid., p. 165).

[118] In R. 16, § 1, the main aim is also to reduce the importance of the role of the memory.

[119] Cf. the strikingly similar formulation in R. 11, § 4.

[120] Cf., once again, the strikingly similar formulation in R. 11, § 5.

[121] The Latin is: '... liceat audacter asserere ...'. Cf. R. 12, § 24 (and R. 8, §§ 5 and 11).

potest reduci, omnibus syllogismorum vinculis rejectis, superest nobis unica haec via, cui totam fidem debeamus adhibere. Nam quaecumque una ex aliis immediate deduximus, si illatio fuerit evidens, illa ad verum intuitum jam sunt reducta. Si autem ex multis et disjunctis unum quid inferamus, saepe intellectus nostri capacitas non est tanta, ut illa omnia possit unico intuitu complecti; quo casu illi hujus operationis certitudo debet sufficere. Quemadmodum non possumus uno oculorum intuitu longioris alicujus catenae omnes annulos distinguere; sed nihilominus, si singulorum cum proximis connexionem viderimus, hoc sufficiet, ut dicamus etiam nos aspexisse, quomodo ultimum cum primo connectatur.

6. Sufficientem hanc operationem esse debere dixi, quia saepe defectiva esse potest, et per consequens errori obnoxia. Interdum enim, etiamsi multa quidem enumeratione
[390] perlustremus, quae valde[82] evidentia sunt, si tamen vel minimum quid omittamus, catena rupta est, et tota conclusionis labitur certitudo. Interdum etiam omnia certe enumeratione[83] complectimur, sed non singula inter se distinguimus, adeo ut omnia confuse tantum cognoscamus.

7. Porro interdum enumeratio haec esse debet completa, interdum distincta, quandoque neutro est opus; ideoque dictum tantum est, illam esse debere sufficientem. Nam si velim probare per enumerationem, quot genera entium sint corporea, sive aliquo pacto sub sensum cadant, non asseram illa tot esse, et non plura, nisi prius certo noverim, me omnia enumeratione fuisse complexum, et singula ab invicem distinxisse. Si vero eadem via ostendere velim, animam rationalem non esse corpoream, non opus erit enumerationem esse completam, sed sufficiet, si omnia simul corpora aliquot collectionibus ita complectar, ut animam rationalem ad nullam ex his referri posse demonstrem. Si denique per enumerationem velim ostendere, circuli aream esse majorem omnibus areis aliarum figurarum, quarum peripheria sit aequalis, non opus est omnes figuras recensere, sed sufficiet[84] de quibusdam in particulari hoc demonstrare, ut per inductionem idem etiam de aliis omnibus concludatur.

8. Addidi etiam, enumerationem debere esse ordinatam: tum[85] quia ad jam enumeratos defectus nullum praesentius remedium est, quam si ordine omnia perscrutemur;
[391] tum etiam, quia saepe contingit ut, si singula, | quae ad rem propositam spectant, essent separatim perlustranda, nullius hominis vita sufficeret, sive quia nimis multa sunt, sive

[82] A, AT, C, and SGZ: valde. Missing in H. N: zeer.
[83] A, AT, C, and SGZ: certe enumeratione. H: certe enumerationes. L: certa enumeratione.
[84] H, C, and SGZ: sufficiet. A and AT: sufficit.
[85] A, AT, C, and SGZ: tum quia ad ... singula, quae. Missing in H, which reads: tum quiae. This is crossed out in L, which reads: [nam si quae].

knowledge cannot be reduced to a simple intuition, there is left to us, who have cast off all the chains[122] of the syllogisms,[123] this one path, to which we should stick with complete confidence. For, whatever individual things we have immediately deduced from others, if the inference was evident, then these things have already been reduced to a true intuition. But, if we infer some one thing from many and disconnected ones, then the capacity of our intellect is often not so great that it could encompass them all in a single intuition. In this case, the certainty of this operation should suffice. In this manner, we cannot, in one ocular intuition, distinguish all the links of a very long chain; but, never the less, if we have seen the connections between the individual ones and their neighbors, then this will suffice in order that we may say that we have also seen how the last link is connected with the first.[124]

6. I have said that this operation should be 'sufficient', because it can often be deficient, and, as a consequence, liable to error. For in an enumeration it sometimes happens that, even though, to be sure, we do survey many things which are very evident, none the less, if we omit even the slightest thing, then the chain is broken and the entire certainty of the conclusion is lost. Also, sometimes we do, to be sure, encompass everything in an enumeration; we do not, none the less, distinguish individual things from one another, so much so, that we know all things only confusedly.

7. This enumeration should, furthermore, be sometimes complete and sometimes distinct, while, at other times, it need be neither of the two. For this reason, it has been said only that the enumeration should be sufficient. For, if I want to prove, through enumeration, how many kinds of entities are corporeal, or how many are, in some way, available to the senses, then I may not assert that there are so many and no more, unless I have previously made sure that I had encompassed all of them in the enumeration and that I had distinguished the ones from the others. On the other hand, if I want to show, in the same way, that the rational soul is not corporeal, then there will be no need for the enumeration to be complete, but rather will it suffice if I group all bodies together into a certain number of classes in such a way that I demonstrate that the rational soul cannot be referred to any of them.[125] Finally, if I want to show, through enumeration, that the area of a circle is greater than the areas of all other figures whose perimeters are equal to that of a circle, then there is no need to review all the figures, but rather will it suffice to demonstrate this for some figures in particular, in order that one may conclude, through induction,[126] the same of all the others too.

8. I have also added that the enumeration should be ordered, partly because there is no more effective remedy for the defects already enumerated than for us to scrutinize all things in an orderly manner, and partly because it often happens that, if every single thing relevant to the matter proposed were to be surveyed separately, then no human lifetime would suffice for doing so, either because there are too many things, or

[122] On 'chains' (*vincula*) cf. R. 2, § 4, and R. 10, § 4.
[123] Cf. R. 2, § 3, R. 10, § 5, R. 13, § 1, and R. 14, § 2.
[124] Is unmediated deduction = intuition? Is mediated deduction = induction? Cf. R. 11, § 2.
[125] Cf. R. 12, § 14.
[126] The term 'induction' was first used in R. 7, § 4, and then employed in that and the following paragraph interchangeably with 'enumeration'. Here, on the other hand, 'induction' appears to assume the now standard sense of 'inference from particular instances of something to all instances of it'.

quia saepius eadem occurrerent repetenda. Sed si omnia illa optimo ordine disponamus, ut plurimum, ad certas classes reducentur, ex quibus vel unicam exacte videre sufficiet, vel ex singulis aliquid, vel quasdam potius quam caeteras, vel saltem nihil unquam bis frustra percurremus; quod adeo juvat, ut saepe multa propter ordinem bene institutum brevi tempore et facili negotio peragantur, quae prima fronte videbantur immensa.

9. Hic autem ordo rerum enumerandarum plerumque varius esse potest, atque ex uniuscujusque arbitrio dependet; ideoque ad illum[86] acutius excogitandum[87] meminisse oportet eorum, quae dicta sunt in quinta propositione. Permulta quoque sunt ex levioribus hominum artificiis, ad quae invenienda tota methodus in hoc ordine disponendo consistit: sic si optimum anagramma conficere velis ex litterarum alicujus nominis transpositione, non opus est a facilioribus ad difficiliora transire, nec absoluta a respectivis distinguere, neque enim ista hic habent locum; sed sufficiet, talem tibi[88] proponere ordinem ad transpositiones litterarum examinandas, ut nunquam bis eaedem percurrantur, et sit illarum numerus, ex. gr., in certas classes ita distributus, ut statim appareat, in quibusnam major sit spes inveniendi quod quaeritur; ita enim saepe non longus erit, sed
[392] tantum puerilis labor. |

10. Caeterum hae tres ultimae propositiones non sunt separandae, quia ad illas simul plerumque est reflectendum, et pariter omnes ad methodi perfectionem concurrunt; neque multum intererat, utra prior doceretur, paucisque easdem hic explicavimus,[89] quia nihil aliud fere in reliquo tractatu habemus faciendum, ubi exhibebimus in particulari quae hic in genere complexi sumus.

Regula VIII

De limitibus rationis humanae

Si in serie rerum quaerendarum aliquid occurrat, quod intellectus noster nequeat satis bene intueri, ibi sistendum est, neque caetera quae sequuntur examinanda sunt, sed a labore supervacuo est abstinendum.

1. Tres regulae praecedentes ordinem praecipiunt et explicant; haec autem ostendit, quandonam sit omnino necessarius, et quando utilis tantum. Quippe quidquid integrum gradum constituit in illa serie, per quam a respectivis ad absolutum quid, vel contra, veniendum est, illud necessario ante omnia quae sequuntur est examinandum. Si vero multa, ut saepe fit, ad eundem gradum pertineant, est quidem semper utile, illa omnia ordine perlustrare. Hunc tamen ita stricte et rigide non cogimur observare, et

[86] C and SGZ: illum. H, A, and AT: illud.
[87] H, A, AT, C, and SGZ: acutius excogitandum. Above this L adds but then crosses out: accuratius exequendum.
[88] AT and C: tibi. H, A, and SGZ: sibi. N: zich.
[89] AT, C, and SGZ: explicavimus. H and A: explicamus. N: zullen ... verklaren.

because the same things would have to be repeated too frequently.[127] But, if we did arrange all these things in the best order, so that, for the most part, they will be traced back to definite classes, then it will suffice to look closely at one of these classes, or at something from each particular class, or at some classes rather than others – or we shall, at least, never run through anything twice in vain. This is so helpful that, due to a well-instituted order, many things which seemed immense, at first sight, can often be accomplished in a short time and with an easy effort.

9. But this order of the things to be enumerated can usually be varied, and it depends on the choice of each and every individual. For this reason, so that the order may be thought out more precisely, one should remember the things that have been said in the fifth proposition.[128] Among the more trivial artifices of human beings, there are also many for whose discovery the whole method consists in arranging them in this order. Thus, if you want to construct a perfect anagram by transposing the letters of some name,[129] then there is no need to pass from the more easy to the more difficult, nor to distinguish absolute things from relative things, for these matters are not involved here. Rather, it will suffice for you to propose such an order for examining the transpositions of the letters that you would never go over the same ones twice, and for you so to distribute the number of them into definite classes, for example, that it would become immediately apparent in which ones were the greater hope of discovering what is sought. For thus it will be seldom tedious, but rather mere child's play.

10. By the way, these last three propositions[130] are not to be separated, because one must, in most cases, reflect on them together, and because they all contribute equally to the perfection of the method. Also, it was not very important which of them was taught first, and we have but briefly explicated them here, because we have almost nothing else to do in the rest of the treatise, where we shall exhibit in detail the things that we have here covered in general.

Rule Eight

On the Limits of Human Reason

If, in a series of things to be investigated, something should occur to us which our intellect is unable to intuit well enough, then we must stop there, and we are not to examine the other things which follow, but rather are we to abstain from superfluous labor.

1. The three preceding rules prescribe and explain order; the present one, on the other hand, shows when order is completely necessary, and when it is merely useful. Of course, whatever constitutes an integral step in the series through which one must pass from things relative to something absolute, or vice versa, does necessarily have to be examined before all the following things. But, if many things belong to the same step, as often happens, then it is always useful, to be sure, to survey all of them in order; we are not forced, none the less, to observe the order thus strictly and rigidly, and it is still

[127] 'Vita brevis, ars longa.' ('Life is short, art is long.') Cf. Seneca, *De brevitate vitae*, 1. Cf. also Hippocrates, *Aphorisms*, 1.1.
[128] I.e., in R. 5.
[129] Cf. R. 10, § 3.
[130] I.e., Rs. 5–7.

[393] plerumque, etiamsi non omnia, | sed pauca tantum vel unicum quid ex illis perspicue cognoscamus, ulterius tamen progredi licet.

2. Atque haec regula necessario sequitur ex rationibus allatis ad secundam; neque tamen existimandum est, hanc nihil novi continere ad eruditionem promovendam, etsi nos tantum a rerum quarumdam disquisitione[90] arcere videatur, non autem ullam veritatem exponere: quippe Tyrones quidem nihil aliud docet, quam ne operam perdant, eadem fere ratione, qua secunda. Sed illis, qui praecedentes septem regulas perfecte noverint, ostendit qua ratione possint in qualibet scientia sibi ipsis ita satisfacere, ut nihil ultra cupiant: nam quicumque priores exacte servaverit circa alicujus difficultatis solutionem, et tamen alicubi sistere ab hac jubebitur, tunc certo cognoscet se scientiam quaesitam nulla prorsus industria posse invenire, idque non ingenii culpa, sed quia obstat ipsius difficultatis natura, vel humana conditio. Quae cognitio non minor scientia est, quam illa quae rei ipsius naturam exhibet; et non ille videretur sanae mentis, qui ulterius curiositatem extenderet.

3. Haec[91] omnia[92] uno aut altero exemplo illustranda sunt. Si, verbi gratia, quaerat aliquis solius Mathematicae studiosus lineam illam, quam in Dioptrica anaclasticam
[394] vocant, | in qua scilicet radii paralleli ita refringantur,[93] ut omnes post refractionem se in uno puncto intersecent, facile quidem animadvertet, juxta regulas quintam et sextam, hujus lineae determinationem pendere a proportione, quam servant anguli refractionis ad angulos incidentiae; sed quia hujus indagandae non erit capax, cum non ad Mathesim pertineat, sed ad Physicam,[94] hic sistere cogetur in limine, neque aliquid aget, si hanc cognitionem vel a Philosophis audire, vel ab experientia velit mutuari: peccaret enim in regulam tertiam. Ac praeterea haec propositio composita adhuc est et respectiva; atqui de rebus tantum pure simplicibus et absolutis experientiam certam haberi posse, dicetur suo loco. Frustra etiam proportionem inter ejusmodi angulos aliquam supponet, quam omnium verissimam[95] esse suspicabitur; tunc enim non amplius anaclasticam quaereret, sed tantum lineam, quae suppositionis suae rationem sequeretur.

4. Si vero aliquis, non solius Mathematicae studiosus, sed qui, juxta regulam primam, de omnibus quae occurrunt veritatem quaerere cupiat, in eandem difficultatem

[90] H, AT, C, and SGZ: disquisitione. A: dispositione.

[91] Cf. N and A on the placement of §§ 3–5 and 6–11, respectively, of this rule. After § 2 H notes: vid: sig: o. I.e., in H there follows the text of R. 8 from 'Atqui ...' at the beginning of § 6, in that case, of § 3, to '... cognovisse' at the end of § 11, in that case, of § 8. N and A, on the other hand, put the text of this rule from 'Haec ...' at the beginning of § 3 to '... abunde' at the end of § 5 first and then continue with the segment from 'Atqui ...' at the beginning of § 6 to '... cognovisse' at the end of § 11. In H, mutatis mutandis, the segment of text from 'Haec ...' at the beginning of § 3 to '... abunde' at the end of § 5 is placed at the very end of the direct commentary on R. 8. In the order of paragraphs, once again, AT and C follow N and A, while SGZ follows H.

[92] A, AT, and C: Haec omnia. H and SGZ: Quae omnia. N: Alle deze dingen.

[93] A, AT, C, and SGZ: refringantur. H: refrangantur.

[94] A, AT, C, and SGZ: Physicam ... vel. Missing in H. I. notes, but does not fill, the lacuna.

[95] H, A, AT, C, and SGZ: verissimam. N may have been reading 'certissimam': zekerste.

permitted, in most cases, to proceed further, even though we do not perspicuously know all the things, but rather only a few, or even just one.[131]

2. In addition, this rule follows necessarily from the reasons adduced for the second rule.[132] Still, we are not to think that the present rule contains nothing new for the advancement of learning, even though it might seem merely to hinder us from a discussion of certain things, but not to expose any truth. To be sure, it does indeed teach beginners – in almost the same manner as the second rule – nothing else than that they should not waste any effort. None the less, it shows those who have become perfectly acquainted with the preceding seven rules how they could so satisfy themselves, in any science whatever, that they would desire nothing more. For someone who, in the solution of a difficulty, has exactly observed the previous rules, but who will still be ordered by the present one to stop somewhere, will then know for certain that one cannot, by means of any amount of industry, find the knowledge sought, and this, because it is not a defect of the natural intelligence, but the nature of the difficulty itself or the human condition, which presents the obstacle to doing so. This recognition is no less knowledge than that which reveals the nature of the thing itself; and one would not seem of sound mind if one were to extend one's curiosity any further.

3. All these things have to be illustrated by means of one or two examples.[133] For instance, if someone who studies mathematics alone were to seek to find that line which, in dioptrics, they call the 'anaclastic', namely, that line from which parallel rays are so refracted that, after the refraction, they all intersect at a single point,[134] then he will, to be sure, easily realize, following the fifth and the sixth rules,[135] that the determination of this line depends on the proportion which the angles of refraction bear to the angles of incidence. Because he will not be capable of finding this proportion, since it pertains, not to mathematics, but to physics, he will be compelled, none the less, to stop right here at the threshold. Nor will he be accomplishing anything if he wants either to acquire this knowledge from the philosophers or to derive it from experience, for that would violate the third rule.[136] In addition, this proposition is both composite and relative; and yet one can have certain experience only of things purely simple and absolute, as will be said in the proper place.[137] Also in vain will he presuppose, between angles of this sort, some proportion which he will suspect to be the truest of all; for then he would be seeking to find, no longer the anaclastic line, but rather only that one which would follow from reasoning on his presupposition.

4. On the other hand, if someone else, who studies not only mathematics, but who, following the first rule,[138] desires to seek to find the truth on all the things that occur to

[131] The enumeration only needs to be 'sufficient' – cf. R. 7, §§ 5–7.

[132] That rule and this rule appear to be positive and negative formulations of similar thoughts.

[133] The genealogy of this rule is much more complicated than that of R. 4. In any case, the account advanced by Jean-Paul Weber in *La constitution du texte des 'Regulae'* (Paris, 1964) has established itself as the standard one (p. 80 ff.). It is that the whole comprises four parts, namely, first, § 1, second, the rule itself and § 2, third, §§ 3–5, and fourth, §§ 6–11. The first and second parts are very probably from the time of the early rules, i.e., 1619–1620, while especially the mature passages of the third and fourth parts stem from the time of the later rules, i.e., 1626–1628.

[134] Cf. Descartes, *Dioptrics*, Discourse 8, where this problem is solved.

[135] This appears to be a reference to Rs. 5 and 6 themselves.

[136] Cf. R. 3, virtually passim.

[137] Cf. R. 12, § 16 ff.

[138] This appears to be a reference to R. 1, passim.

inciderit, ulterius inveniet, hanc proportionem inter angulos incidentiae et refractionis pendere ab eorundem mutatione propter varietatem mediorum; rursum hanc mutationem pendere a modo, quo[96] radius penetrat per totum diaphanum, atque hujus pene
[395] trationis cognitionem supponere illuminationis naturam | etiam esse cognitam; denique ad illuminationem intelligendam sciendum esse, quid sit generaliter potentia naturalis, quod ultimum est in tota hac serie maxime absolutum. Hoc igitur postquam per intuitum mentis clare perspexerit, redibit per eosdem gradus, juxta regulam quintam; atque si statim in secundo gradu illuminationis naturam non possit agnoscere, enumerabit, per regulam septimam, alias omnes potentias naturales, ut ex alicujus alterius cognitione saltem per imitationem, de qua postea, hanc etiam intelligat; quo facto quaeret, qua ratione penetret radius per totum diaphanum; et ita ordine caetera persequetur, donec ad ipsam anaclasticam pervenerit. Quae etiamsi a multis frustra hactenus fuerit quaesita, nihil tamen video quod aliquem, nostra methodo perfecte utentem, ab illius evidenti cognitione possit impedire.

5. Sed demus omnium nobilissimum exemplum. Si quis pro quaestione sibi proponat, examinare veritates omnes, ad quarum cognitionem humana ratio sufficiat, quod mihi videtur semel in vita faciendum esse ab iis omnibus, qui serio student ad bonam mentem,[97] ille profecto per regulas datas[98] inveniet, nihil prius cognosci posse quam intellectum, cum ab hoc caeterorum omnium cognitio dependeat, et non contra; perspectis deinde illis omnibus quae proxime sequuntur post intellectus puri cognitionem, inter caetera enumerabit quaecumque alia habemus instrumenta cognoscendi praeter
[396] intellectum, quae sunt tantum duo, nempe | phantasia et sensus. Omnem igitur collocabit industriam in distinguendis et examinandis illis tribus cognoscendi modis, vidensque veritatem proprie vel falsitatem non nisi in solo intellectu esse posse, sed tantummodo ab aliis duobus suam saepe originem ducere, attendet diligenter ad illa omnia, a quibus decipi potest, ut caveat; et enumerabit exacte vias omnes, quae

[96] AT, C, and SGZ: a modo, quo. H: a modo. L: a modo, quo. A: a medio, quod. N: van de middel ..., volgens dewelk.

[97] H, C, and SGZ: ad bonam mentem. A and AT: ad bonam mentem pervenire. N (phrase): naar een goed oordeel trachten.

[98] A, AT, C, and SGZ: datas. Missing in H. N: gegevene.

him, has run into the same difficulty, then he will discover, in addition, that this proportion between the angles of incidence and the angles of refraction depends on the changes in these angles due to the differences in the media. Once again, he will discover that these changes depend on the manner in which the ray penetrates the whole transparent body,[139] and that knowledge of this penetration presupposes that he also knows the nature of illumination. Finally, he will discover that, in order to understand illumination, he must know what a natural power in general is – which last term is the most absolute in this whole series.[140] Therefore, after he has clearly grasped this through mental intuition, he will, in accordance with the fifth rule,[141] retrace his course through the same steps. If he cannot, at the second step, immediately recognize the nature of illumination, then he will, in accordance with the seventh rule,[142] enumerate all the other natural powers, in order that, by means of a knowledge of some other one, he might also understand this one, at least by analogy – more of this later.[143] Having done this, he will investigate the manner in which the ray penetrates the whole transparent body. Thus he will pursue the remaining items in order, until he has arrived at the anaclastic itself. Even though many have hitherto sought the anaclastic in vain, I still do not see anything that could prevent anyone who is using our method perfectly from gaining an evident knowledge of this line.

5. But let us give the finest example of all.[144] If someone were to propose to himself, as a question, to examine all the truths for the knowledge of which human reason suffices – which, it seems to me, anyone who is seriously striving for a good mind[145] has to do once in life[146] –, then he will indeed discover, by means of the given rules, that nothing can be known prior to the intellect, since the knowledge of all other things depends on it, and not vice versa. Then, having looked thoroughly at all the things that follow immediately upon the knowledge of the pure intellect, he will enumerate, among the remaining things, whatever other instruments of knowing we possess besides the intellect, of which there are only two, namely, the fantasy and the senses.[147] He will, therefore, devote all his industry to distinguishing and to examining these three modes of knowing. And, seeing that there can be no truth or falsity, in the proper sense, except in the intellect alone, but that often truth and falsity only derive their origin from the other two modes of knowing, he will carefully attend to all the things that can mislead him, in order that he might beware of them. Also, he will exactly enumerate all the paths to the truth which are accessible to human beings, in

[139] The 'whole transparent body' (*totum diaphanum*) is the 'very subtle and very fluid matter' (*matière fort subtile et fort fluide*) which Descartes, who – like nature as he conceives it – abhors a vacuum (*vide*) (cf. AT, II, 465), holds to be the medium of the transmission of light. Cf. *Dioptrics*, Discourse 1.

[140] Cf. the definition of 'absolute': R. 6, § 3.

[141] Cf. esp. R. 5 itself and § 1 of that rule.

[142] Cf. R. 7, passim.

[143] This is the only occurrence of 'imitatio' ('analogy') in the *Rules*. According to R. 8, § 10, and R. 12, § 27, the issue would have become acute in Rs. 24–36. But see *Dioptrics*, Discourses 1–2.

[144] This paragraph appears partially to duplicate material found in § 8 of this rule.

[145] Cf. R. 1, § 1.

[146] 'Semel in vita': Cf. §§ 6 and 8 of this rule as well as *Meditations*, M. 1, § 1.

[147] Cf. § 9 of this rule, where there are 'three' other faculties. Yet, according to R. 12, § 8, the 'memory' is the retentive fantasy – which would leave but 'two' distinct faculties besides the intellect.

hominibus patent ad veritatem, certam ut sequatur: neque enim tam multae sunt, quin facile omnes et per sufficientem enumerationem inveniat, quodque mirum et incredibile videbitur inexpertis, statim atque distinxerit circa singula objecta cognitiones illas, quae memoriam tantum implent vel ornant, ab iis propter quas vere aliquis magis eruditus dici debet: quod facile etiam assequetur ... :[99] sentiet omnino se nihil amplius ignorare ingenii defectu vel artis, neque quidquam prorsus ab alio homine sciri posse, cujus etiam non sit capax, modo tantum ad illud idem, ut par est, mentem applicet. Et quamvis multa saepe ipsi proponi possint, a quibus quaerendis per hanc regulam prohibebitur: quia tamen clare percipiet, illa eadem omnem humani ingenii captum excedere, non se idcirco magis ignarum esse arbitrabitur; sed hoc ipsum, quod sciet rem quaesitam a nemine sciri posse, si aequus est, curiositati suae sufficiet abunde.

6. Atqui ne semper incerti simus, quid possit animus, neque perperam et temere laboremus,[100] antequam ad res in particulari cognoscendas nos accingamus, oportet
[397] semel in vita diligenter quaesivisse, quarumnam cogni|tionum humana ratio sit capax. Quod ut melius fiat, ex aeque facilibus, quae utiliora sunt, priora semper quaeri debent.

7. Haec methodus siquidem illas ex mechanicis artibus imitatur, quae non aliarum ope indigent, sed tradunt ipsaemet, quomodo sua instrumenta facienda sint. Si quis enim unam ex illis, ex. causa, fabrilem vellet exercere, omnibusque instrumentis esset destitutus, initio quidem uti cogeretur duro lapide, vel rudi aliqua ferri massa pro incude, saxum mallei loco sumere, ligna in forcipes aptare, aliaque ejusmodi pro necessitate colligere; quibus deinde paratis, non statim enses aut cassides, neque quidquam eorum, quae fiunt ex ferro, in usus aliorum cudere conaretur;[101] sed ante omnia malleos, incudem, forcipes, et reliqua sibi[102] ipsi utilia fabricaret. Quo exemplo docemur, cum in his initiis nonnisi incondita quaedam praecepta, et quae videntur potius mentibus[103] nostris ingenita quam arte parata, poterimus invenire, non statim Philosophorum lites dirimere, vel solvere Mathematicorum nodos, illorum ope esse tentandum; sed iisdem prius utendum ad alia, quaecumque ad veritatis examen magis necessaria sunt, summo studio perquirenda, cum praecipue nulla ratio sit, quare difficilius videatur haec eadem invenire, quam ullas quaestiones ex iis, quae in Geometria vel Physica aliisque disciplinis solent proponi.

8. At vero nihil hic utilius quaeri potest, quam quid sit humana cognitio et quous-
[398] que extendatur. Ideoque nunc hoc ipsum unica quaestione complectimur, quam |

[99] Here there is a lacuna in H and in A. H: hic deficit aliquid. I: [hic deficit aliquid]. A: Hic deficit aliquid. N does not signal any lacuna.
[100] C: laboremus. H, A, AT, and SGZ: laboret. N: wy ... arbeiden.
[101] H, A, AT, and C: conaretur. SGZ: conarentur.
[102] A, AT, C, and SGZ: sibi ... non-. Missing in H. I notes, but does not fill, the lacuna.
[103] H, A, AT, and C: mentibus. SGZ: mentis.

order that he may follow the certain one. For there are not so many of these paths that he could not easily discover all of them, and this, by means of a sufficient enumeration. What will seem surprising and incredible to the inexperienced is that, as soon as he has also distinguished, with respect to individual objects, that knowledge which merely fills or adorns the memory from that due to which someone should truly be called 'more learned' – which will also be easily accomplished – ... ,[148] he will feel that it is not at all due to a defect of natural intelligence or of art that he does not know more than he does, and that no other human being can know anything at all which he himself were incapable of knowing, if only he applies the mind to it in an appropriate fashion. Although many things could often be proposed to him which this rule will prohibit him from investigating, still, because he will clearly perceive that these same things completely exceed the grasp of human natural intelligence, he will not, on that account, think himself to be more ignorant than others. Rather, if he is judicious, then this itself, namely, that he will know that no one can know the matter in question, will abundantly satisfy his curiosity.

6. But now, so that we might not be forever uncertain about what the mind can achieve, and so that we might not labor in a misguided and haphazard fashion, it is necessary, once in life – before we set out to go after things to be known in particular – carefully to have inquired as to which knowledge human reason is capable of attaining. In order to do this better, we should always investigate those things first which, of things equally easy, are more useful.

7. This method resembles, in fact, the procedures of the mechanical arts, which do not need any methods other than their own, but which rather provide their own instructions on how their own instruments have to be made. For, if someone wanted to practice one of these crafts, for example, to become a blacksmith, and he lacked all the tools, then he would be forced, at least at first, to use a hard stone or some rough lump of iron as an anvil, to use a rock in place of a hammer, to make a pair of tongs out of pieces of wood, and to put together other such tools according to necessity. Once these things had been prepared, then, he would not immediately attempt to forge swords or helmets or anything made of iron for the use of others; rather, he would, first of all, make hammers, an anvil, tongs, and the other things useful to himself. This example teaches us that, since we have been able, in these preliminaries, to discover only some rough precepts, which seem innate to our minds rather than acquired by art, we are not immediately to attempt, with the help of these precepts, to settle the disputes of the philosophers or to solve the puzzles of the mathematicians; but rather that we are first to use these precepts to seek out, with extreme care, the other things which are more necessary for the examination of the truth, especially since there is no reason why these things should seem more difficult to discover than any of the answers to the questions usually posed in geometry, or in physics, and in other disciplines.

8. But here one can inquire into nothing more useful, in fact, than into what human knowledge is and how far it extends.[149] Therefore, we are now summarizing this very inquiry by means of a single question, which, we think, is the first question of

[148] Here there is a lacuna in the Latin texts of H and A.
[149] This paragraph appears partially to duplicate material found in § 5 of this rule.

omnium primam[104] per regulas jam ante traditas examinandam esse censemus; idque semel in vita ab unoquoque ex iis, qui tantillum amant veritatem, esse faciendum: quoniam in illius investigatione vera instrumenta sciendi et tota methodus continentur.[105] Nihil autem mihi videtur ineptius, quam de naturae arcanis, coelorum in haec inferiora virtute, rerum futurarum praedictione, et similibus, ut multi faciunt, audacter disputare, et ne quidem tamen unquam, utrum ad illa invenienda humana ratio sufficiat, quaesivisse. Neque res ardua aut difficilis videri debet, ejus, quod in nobis ipsis sentimus, ingenii limites definire, cum saepe de illis etiam, quae extra nos sunt et valde aliena, non dubitemus judicare. Neque immensum est opus, res omnes in hac universitate contentas cogitatione velle[106] complecti, ut, quomodo singulae mentis nostrae examini subjectae sint, agnoscamus: nihil enim tam multiplex esse potest aut dispersum, quod per illam, de qua egimus, enumerationem certis limitibus circumscribi atque in aliquot capita disponi non possit. Ut autem hoc experiamur, in quaestione proposita, primo, quidquid ad illam pertinet, in duo membra dividimus: referri enim debet, vel ad nos, qui cognitionis sumus capaces, vel ad res ipsas, quae cognosci possunt; quae duo separatim discutimus.

9. Et quidem in nobis advertimus, solum intellectum scientiae esse capacem; sed a tribus aliis facultatibus hanc[107] juvari posse vel impediri, nempe ab imaginatione, sensu, et memoria. Videndum est igitur ordine, quid singulae ex his facultatibus obesse pos-
[399] sint, ut | caveamus; vel prodesse, ut omnes illarum copias impendamus. Atque ita haec pars per sufficientem enumerationem erit discussa, ut ostendetur in sequenti propositione.

10. Veniendum deinde ad res ipsas, quae tantum spectandae sunt prout ab intellectu attinguntur; quo sensu dividimus illas in naturas maxime simplices, et in complexas sive compositas. Ex simplicibus nullae esse possunt, nisi vel spirituales, vel corporeae, vel ad utrumque pertinentes; denique ex compositis alias quidem intellectus tales esse experitur, antequam de iisdem aliquid determinare[108] judicet; alias autem ipse componit. Quae omnia fusius exponentur in duodecima propositione, ubi demonstrabitur falsitatem nullam esse posse, nisi in his ultimis quae ab intellectu componuntur: quas

[104] A, AT, C, and SGZ: primam. H: primum.
[105] A, AT, and C: continentur. H and SGZ: continetur.
[106] H, A, AT, C, and SGZ: cogitatione velle. H: cogitatione vecce. L: cogitationes [?] recte.
[107] H, C, and SGZ: hanc. A and AT: hunc.
[108] H, A, AT, C, and SGZ: determinare. L: determinate.

all to be examined by means of the rules already presented above. And this, we think, everyone who loves the truth even a little has to do once in life, since the investigation of this question contains the true instruments of knowing and the entire method. But nothing seems to me more foolish than to dispute boldly, as many do, about the secrets of nature, about the influence of the heavens on these lower regions, about the prediction of future events, and about similar matters, yet without ever having even inquired as to whether human reason suffices for discovering these matters. Nor should one regard it as an arduous or even as a difficult matter to define the limits of the natural intelligence which we sense in ourselves, since we often do not hesitate to judge even about the things which are outside us and quite foreign to us. Nor is it an immeasurable task to want to encompass, in thought, all the things contained in the universe, in order that we might recognize in what manner we may subject individual ones to the examination of our mind. For nothing can be so multifaceted or so diffuse that it could not be circumscribed by certain limits as well as arranged under a certain number of headings by means of the enumeration of which we have been treating.[150] But, in order that we might see this, in the question proposed, we first divide whatever is relevant to the question into two parts; for the question should relate, either to us, who are capable of knowledge, or to the things themselves, which can be known.[151] We discuss these two parts separately.

9. We realize, to be sure, that, within ourselves, the intellect alone is capable of knowledge; we realize, none the less, that it can be helped or hindered by three other faculties, namely, the imagination, the senses, and the memory.[152] Therefore, we have to see, in order, in which respects these individual faculties could hinder, in order that we may beware of them, or in which respects they could help, in order that we may employ all their resources. Thus we shall have discussed this part of the question by way of a sufficient enumeration, as we shall show in the following proposition.[153]

10. One has to come, then, to the things themselves,[154] which are to be considered only in so far as the intellect reaches them. In this sense, we divide them into most simple natures and complex or composite natures. All simple natures must be either spiritual or corporeal, or spiritual and corporeal. Finally, as for the composite natures, to be sure, the intellect does experience some to be such before it decides to determine anything about them; none the less, the intellect itself composes others. All these matters will be explained in greater detail in the twelfth proposition,[155] where it will be demonstrated that there can be no falsity except in these last natures, which are composed

[150] Cf. the previous rule, passim, but esp. § 4.
[151] Cf. R. 12, § 2, for essentially the same distinction.
[152] Did Descartes intend to substitute the passage starting here for R. 8, § 5, which lists only 'two' other faculties besides the intellect? Cf. the passage beginning with R. 12, § 2, as well, which also proceeds from a total of four faculties.
[153] I.e., in R. 9. But the enumeration actually occurs in R. 12, §§ 3–11.
[154] It may well be that this is one of the loci classici for the formulation of the motto of the phenomenological movement (1900–1901 ff.): 'To the things themselves.' Cf. Edmund Husserl, *Logische Untersuchungen*, vol. II, pt. 1, *Untersuchungen zur Phänomenologie und Theorie der Erkenntnis* (Husserliana vol. XIX/1), ed. U. Panzer (The Hague/Boston/Lancaster, 1984), p. 10, ll. 13–14: 'Wir wollen auf die "Sachen selbst" zurückgehen.' Cf. also R. 8, § 8, R. 12, §§ 2 and 11, and R. 13, § 5.
[155] I.e., in R. 12. This paragraph of this rule provides a summary of R. 12, §§ 12–21.

idcirco adhuc distinguimus in illas, quae ex simplicissimis naturis et per se cognitis deducuntur, de quibus in toto sequenti libro tractabimus; et illas, quae alias etiam praesupponunt, quas a parte rei compositas esse experimur, quibus exponendis tertium librum integrum destinamus.

11. Et quidem in toto tractatu conabimur vias omnes, quae ad cognitionem veritatis hominibus patent, tam accurate persequi et tam faciles exhibere, ut quicumque hanc totam methodum perfecte didicerit, quantumvis mediocri sit ingenio, videat tamen
[400] nullas omnino sibi | potius quam caeteris esse interclusas, nihilque amplius se ignorare ingenii defectu vel artis. Sed quoties ad alicujus rei cognitionem mentem applicabit, vel illam omnino reperiet; vel certe ab aliquo experimento pendere perspiciet, quod in sua potestate non sit, ideoque non culpabit ingenium[109] suum, quamvis ibi sistere cogatur; vel denique rem quaesitam omnem humani ingenii captum excedere demonstrabit, ac proinde non se idcirco magis ignarum esse arbitrabitur, quia non minor scientia est hoc ipsum quam quidvis[110] aliud cognovisse.

Regula IX

De perspicacitate intuitionis

Oportet ingenii aciem ad res minimas et maxime faciles totam convertere, atque in illis diutius immorari, donec assuescamus veritatem distincte et perspicue intueri.

1. Expositis duabus intellectus nostri operationibus, intuitu et deductione, quibus solis ad scientias addiscendas utendum esse diximus, pergimus in hac et sequenti propositione explicare, qua industria possimus aptiores reddi ad illas exercendas, et simul duas praecipuas ingenii facultates excolere, perspicacitatem scilicet, res singulas distincte intuendo, et sagacitatem, unas ex aliis artificiose deducendo.

[109] H, A, AT, and C: ingenium. SGZ: ingenim.
[110] C: quidvis. H: quid vis. A, AT, and SGZ: quodvis.

by the intellect.[156] For this reason, we further distinguish these natures into those which are deduced from the natures most simple and known per se, of which we shall be treating in the entire following book, and those which also presuppose others which we experience to be composite as a matter of fact, to whose exposition we devote the whole third book.[157]

11. But we shall indeed be trying, throughout this treatise, to pursue so accurately all the paths to the knowledge of the truth which are accessible to human beings, and to exhibit these paths as so accessible, that anyone who has perfectly learned this whole method, however mediocre a natural intelligence he might possess, may still see that there are no paths at all closed to him but open to others, and that it is not due to a defect of natural intelligence or of art that he does not know more than he does. Rather, so often as he will apply the mind to the knowledge of something: either he will find what he is seeking; or he will surely realize that it depends on some observation which is not in his power, and thus, even though he may be forced to stop there, he will not blame his natural intelligence; or, finally, he will demonstrate that the thing sought completely exceeds the grasp of human natural intelligence, and, for this reason, he will not, on that account, think himself to be more ignorant than others, because it is no less knowledge to have recognized this itself than anything else.

Rule Nine

On Perspicacity of Intuition

We should totally focus the vision of the natural intelligence on the smallest and easiest things, and we should dwell on them for a long time, so long, until we become accustomed to intuiting the truth distinctly and perspicuously.

1. Having now provided an exposition of the two operations of our intellect, intuition and deduction,[158] which alone, as we have said, are to be employed in the acquisition of knowledge,[159] we proceed, in this and the following proposition, to explain by means of what industry we can render ourselves more apt at exercising these operations, and, at the same time, how we might cultivate the two principal faculties of the natural intelligence,[160] namely, perspicacity in the distinct intuition of individual things,[161] and sagacity in the artful deduction of the ones from the others.[162]

[156] Cf. esp. R. 12, §§ 16 and 19.
[157] Cf. R. 12, § 27, for the details of the structure and of the content of the *Rules*.
[158] Cf. R. 3, § 4 ff. It is conceivable that, in an earlier version of the *Rules*, there was less material between R. 3 and R. 9 than there is in the version that has been handed down.
[159] Cf. the rigorous restriction contained in the final clause of R. 3 itself.
[160] Actually, Rs. 9–11 constitute a series in which the first elucidates perspicacity and intuition, the second, sagacity and deduction, and the third, capacity and enumeration or induction.
[161] Cf. this rule. On *perspicacitas* or *perspicuitas* in Classical rhetoric cf. Lausberg, *Handbuch der literarischen Rhetorik*, §§ 315, 528–537, 810, and 1067–1070. Cicero sometimes uses the terms 'perspicuitas' and 'evidentia' synonymously (*Academica*, bk. II, ch. 17). Cf. also Quintilian, *Institutio oratoria*, I, vi, 41, II, iii, 8, IV, ii, 31–32, 36–39, 64, and 104, and VIII, i, 1, ii, 1–24, iii, 3, 15, and 61.
[162] Cf. the next rule.

2. Et quidem, quomodo mentis intuitu sit utendum, vel ex ipsa oculorum compara-
[401] tione cognoscimus: nam qui vult multa simul objecta eodem intuitu respicere, nihil illorum distincte videt; et pariter, qui ad multa simul unico cogitationis actu solet attendere, confuso ingenio est. Sed Artifices illi, qui in minutis operibus exercentur, et oculorum aciem ad singula puncta attente dirigere consueverunt, usu capacitatem acquirunt res quantumlibet exiguas et subtiles perfecte distinguendi; ita etiam illi, qui variis simul objectis cogitationem nunquam distrahunt, sed ad simplicissima quaeque et facillima consideranda totam semper occupant, fiunt perspicaces.

3. Est autem commune vitium Mortalibus, ut quae difficilia pulchriora videantur; et plerique nihil se scire existimant, quando alicujus rei causam valde perspicuam et simplicem vident, qui interim sublimes quasdam et alte petitas Philosophorum rationes admirantur, etiamsi illae ut plurimum fundamentis nitantur a nemine unquam satis perspectis, male sani[111] profecto qui tenebras clariores[112] habent quam lucem. Atqui notandum est illos, qui vere sciunt, aequa facilitate dignoscere veritatem, sive illam ex simplici subjecto, sive ex obscuro eduxerunt:[113] unamquamque enim simili, unico, et distincto actu comprehendunt, postquam semel ad illam pervenerunt; sed tota diversitas est in via, quae certe longior esse debet, si ducat[114] ad veritatem a primis et maxime absolutis principiis magis remotam.

4. Assuescant igitur omnes oportet, tam pauca simul et tam simplicia cogitatione
[402] complecti, ut nihil unquam se scire putent, quod non aeque distincte intuean|tur, ac illud quod omnium distinctissime cognoscunt. Ad quod quidem nonnulli longe aptiores nascuntur, quam caeteri, sed arte etiam et exercitio ingenia ad hoc reddi possunt longe aptiora; unumque est quod omnium[115] maxime hic monendum mihi videtur,

[111] H, AT, C, and SGZ: sani. A: sane.
[112] H and C: clariores. A, AT, and SGZ: chariores. N: hever.
[113] H, C, and SGZ: eduxerunt. A and AT: eduxerint.
[114] A, AT, and SGZ: ducat. H and C: ducet.
[115] H, A, AT, and C: omnium. Missing in SGZ.

2. We know, of course, how we have to employ mental intuition, especially from the comparison with the eyes.[163] For whoever tries to look at many objects together with one and the same intuitive glance sees none of them distinctly. Likewise, whoever is inclined to attend to many things at the same time by means of a single act of thought possesses confused natural intelligence. Those craftsmen who are employed in minute operations and who have become accustomed to attentively focusing their ocular vision on individual points, on the other hand, acquire, by means of practice, the capacity to distinguish perfectly between things, however fine and subtle. So also do those become perspicacious who never let thought be distracted by various and sundry objects at the same time, but who rather always devote their undivided attention to the consideration of the simplest and easiest matters.

3. It is a vice common among mortals, however, to hold difficult matters for more attractive than easy ones; and most, who admire certain sublime and far-fetched arguments of the philosophers, even though these are, for the most part, based on foundations which no one has ever satisfactorily inspected, think, at the same time, that they know nothing, when they see a very perspicuous and simple cause of something – due to poor health, indeed, they hold darkness to be clearer than light. But one has to note that those who really do know discern the truth with equal ease whether they have educed it from a simple subject or from an obscure one.[164] For, once they have arrived at the truth, they comprehend each and every truth by means of a similar, singular, and distinct act. But the difference lies entirely in the path taken, which must surely be longer if it leads to a truth more removed from first and most absolute principles.

4. It is necessary, therefore, for all to become accustomed simultaneously to encompassing, in thought, things so few and so simple that they never think that they know what they do not intuit equally as distinctly as what they know most distinctly of all.[165] To be sure, some are born much more apt at this than others; none the less, the natural intelligence can be rendered much more apt at it through art and through exercise.[166] There is here, it seems to me, one thing which has to be stressed above all others, namely, that everyone should be firmly convinced that the sciences, however abstruse,

[163] The preference of some philosophers for the sense of sight over that of hearing, smell, taste, and touch goes back at least to Aristotle, *Metaphysics*, 980 a 22–28 (bk. I, ch. 1). But can one say that human beings generally prefer this sense to all the others? And do they know more through the sense of sight than through any of the other senses? Who would rather be deprived of the sense of touch than of the sense of sight? In any case, Descartes' epistemology too is predicated upon a clear preference for the detachment of the sense of sight and upon a strong prejudice against the attachment of the sense of touch. Still, cf., e.g., *The World* or *Treatise on Light*, AT, XI, 5–6.

[164] Cf. a somewhat similar formulation in R. 12, § 25.

[165] Cf. R. 2, § 6. Descartes, who has not read Wittgenstein on such subjects (cf. *Über Gewißheit / On Certainty*, ed. G. E. M. Anscombe and G. H. von Wright [Oxford, 1969], passim), refuses to play what may be called 'Evidenzspiele' ('evidence-games'), i.e., he posits that all evidence is modeled after mathematical evidence. For the definition of '(clear and) distinct perception' cf. *Principles*, pt. I, § 45.

[166] 'Art' for Descartes can be another word for 'method': Cf. R. 6, §§ 1 and 5. The sense of his claim is: 'Art improves upon nature.' Cf. Isocrates, *Against the Sophists*, 14 ff., and *Antidosis*, 189 ff.; Plato, *Phaedrus*, 269 d; Cicero, *Pro Archia*, bk. VII, ch. 15; *Tusculanae disputationes*, bk. II, ch. 13; *De oratore*, bk. I, ch. 25, sec. 113 ff., and II, 88, 360; Cicero (?), *Ad Herennium*, bk. III, ch. 16; Horace, *Ars Poetica*, 408–411; Longinus, *On the Sublime*, 36, 4; and Quintilian, *Institutio oratoria*, II, xix, 1 ff., and XI, iii, 11 ff. Also, the medievals said: 'Natura fundat ingenium, probevit usus.' Descartes would

nempe ut quisque firmiter sibi persuadeat, non ex magnis et obscuris rebus, sed ex facilibus tantum et magis obviis scientias quantumlibet occultas esse deducendas.

5. Nam, e.g., si velim examinare, utrum aliqua potentia naturalis possit eodem instanti transire ad locum distantem, et per totum medium, non statim ad magnetis vim, vel astrorum influxus, sed ne quidem ad illuminationis celeritatem mentem convertam, ut inquiram, utrum forte tales actiones fiant in instanti: hoc enim difficilius possem probare quam quod quaeritur; sed potius ad motus locales corporum reflectam, quia nihil in toto hoc genere magis sensibile esse potest. Et advertam, lapidem quidem non posse in instanti ex uno loco ad alium pervenire, quia corpus est; potentiam vero, similem illi quae lapidem movet, nonnisi in instanti communicari, si ex uno subjecto ad aliud nuda perveniat. Ver. gr., si quantumvis longissimi baculi unam extremitatem moveam, facile concipio potentiam, per quam illa pars baculi movetur, uno et eodem instanti alias etiam omnes ejus partes necessario movere, quia tunc communicatur nuda,[116] neque in aliquo corpore existit, ut in lapide a quo deferatur.

6. Eodem modo, si agnoscere velim, quomodo ab una et eadem simplici causa con- [403] trarii simul effectus possint | produci, non pharmaca a Medicis mutuabor, quae humores quosdam expellant, alios retineant; non de Luna hariolabor, illam per lumen calefacere, et refrigerare per qualitatem occultam; sed potius intuebor libram, in qua

[116] A, AT, C, and SGZ: nuda. Missing in H.

are to be deduced, not from grand and obscure matters, but only from easy and more accessible ones.

5. Thus, for example, if I wish to examine whether some natural power can instantaneously travel to a distant place, and this, through the whole medium, then I shall not immediately turn my attention to the magnetic force or to the influence of the stars or even to the speed of light, in order to inquire as to whether such actions could perhaps occur instantaneously.[167] For it would be more difficult for me to investigate this than what I am seeking. Rather, I shall reflect on the local motions of bodies, because nothing in this whole area can be more accessible to sensibility. And I shall realize that, to be sure, a stone cannot instantaneously pass from one place to another, because it is a body, but that, none the less, a power similar to that which moves the stone is only then transmitted instantaneously if it can pass, in its bare state, from one object to another. For instance, I easily conceive that, if I move one end of a staff, however long the staff may be, then the power which moves that part of the staff necessarily also moves all the other parts of it instantaneously,[168] because that power is then transmitted in its bare state, and it does not exist in some body, such as in a stone which carries it along.[169]

6. In the same manner, if I wish to know how one and the same simple cause can simultaneously produce opposite effects, then I shall not borrow remedies from the physicians, which might expel some humors and retain others; nor shall I rattle on, with respect to the moon, that it warms by means of light and that it cools by means of

agree, but he might prefer 'methodus' (*method*) to 'usus'. I.e.: 'Nature establishes natural intelligence; method develops it.' Cf. H. Walther, *Lateinische Sprichwörter und Sentenzen des Mittelalters in alphabetischer Anordnung* (Göttingen, 1963 ff.), vol. 15, no. 925 a.

[167] In *The World or The Treatise on Light* (drafted in 1632, but left unpublished) Descartes would posit, in the context of a general theory of light (cf. AT, XI, esp. ch. 13 of the *Treatise*), that light is transmitted from one place to another instantaneously (cf., e.g., AT, XI, 98). But Descartes' colleague Isaac Beeckman (1588–1637), who in 1629 had shown via experimentation that the speed of light is finite, would be skeptical as to whether it were possible for anything corporeal to move at infinite velocity. Remarkably, Descartes would respond (Letter to Beeckman, Aug. 22, 1634) that, 'while light does not move instantaneously', '[it] does instantaneously arrive at the eye from the body which emits it', as well as that he were 'so certain' of this 'that, if it could be proved false, then I would be ready to admit that I know nothing at all in philosophy' (cf. AT, I, 307–308). Thus one difference between Descartes' position in the *Treatise* and that in the correspondence is that, in the former, he maintains the instantaneous transmission of light, whereas, in the latter, he denies it, thus agreeing with Beeckman, and asserts, in opposition to an account of an experiment outlined by his correspondent, the existence of an experiment proving an inability to discern a time-lag between the instant at which the light is emitted from the luminous body and the instant at which the light enters the eye, thus disagreeing with Beeckman (cf. ibid., p. 308). Yet the experiments described are crude because their results depend heavily on the sense-perceptions of the experimenters, which cannot be exactly measured, and therefore it is questionable whether they yield the results claimed (cf. ibid., pp. 309–310). In any case, all primitive attempts to clock the speed of light, including the hilltop lantern signal experiments of Galileo, were doomed to failure because of the distances involved, which were inevitably far too short. On the other hand, on the basis of observations of the eclipses of the satellites of Jupiter, the Danish astronomer Ole Romer (1644–1710) would discover (1675–1676) that light travels through space, not in an instant, but at a (de)finite velocity; he would also somewhat underestimate the speed of light to be 140,000 miles per second.

[168] Cf. AT, XI, 90.

[169] For similar examples developed more elaborately, see *Dioptrics*, Discourse 1.

idem pondus uno[117] et eodem instanti unam lancem elevat, dum aliam deprimit, et similia.

Regula X

De sagacitate deductionis

Ut ingenium fiat sagax, exerceri debet in iisdem quaerendis, quae jam ab aliis inventa sunt, et cum methodo etiam levissima quaeque hominum artificia percurrere, sed illa maxime, quae ordinem explicant vel supponunt.

1. Eo me fateor natum esse ingenio, ut summam studiorum voluptatem, non in audiendis aliorum rationibus, sed in iisdem propria industria inveniendis semper posuerim; quod me unum cum juvenem adhuc ad scientias addiscendas allexisset, quoties novum inventum aliquis liber pollicebatur in titulo, antequam ulterius legerem, experiebar utrum forte aliquid simile per ingenitam quandam sagacitatem assequerer, cavebamque exacte, ne mihi hanc oblectationem innocuam festina lectio praeriperet. Quod toties successit, ut tandem animadverterim, me non amplius, ut caeteri solent, per vagas et caecas disquisitiones, fortunae auxilio potius quam artis, ad rerum veritatem pervenire; sed certas regulas, quae ad hoc non parum juvant, longa experientia
[404] percepisse, quibus usus sum postea ad | plures excogitandas. Atque ita hanc totam methodum diligenter excolui, neque omnium maxime utilem studendi modum ab initio sequutum fuisse mihi persuasi.

2. Verum, quia non omnium ingenia tam propensa sunt a natura rebus proprio marte indagandis, haec propositio docet, non statim in difficilioribus et arduis nos occupari oportere, sed levissimas quasque artes et simplicissimas prius esse discutiendas, illasque maxime, in quibus ordo magis regnat, ut sunt artificum qui telas et tapetia texunt, aut mulierum quae acu pingunt, vel fila interniscent texturae infinitis modis variatae; item omnes numerorum lusus et quaecumque ad Arithmeticam pertinent, et similia: quae omnia mirum quantum ingenia exerceant, modo non ab aliis illorum inventionem mutuemur, sed a nobis ipsis. Cum enim nihil in illis maneat occultum, et tota cognitionis humanae capacitati aptentur, nobis distinctissime exhibent innumeros ordines, omnes inter se diversos, et nihilominus regulares, in quibus rite observandis fere tota consistit humana sagacitas.

3. Monuimusque idcirco, quaerenda esse illa cum methodo, quae in istis levioribus non alia esse solet, quam ordinis, vel in ipsa re existentis, vel subtiliter excogitati, constans

[117] A, AT, C, and SGZ: uno. Missing in H.

some occult quality; but rather shall I look at a pair of scales, on which the same weight instantaneously raises the one scale and lowers the other, and similar things.

Rule Ten

On Sagacity of Deduction

In order to render the natural intelligence sagacious, we should exercise it in those things to be sought which have already been discovered by others, and we should, accompanied by method, also run through even the most trivial artifices of human beings, but especially those which exhibit or presuppose order.

1. I confess that I have been born with such natural intelligence that I have always derived the greatest scholarly pleasure, not from listening to the reasoning of others, but from discovering reasons by my own industry.[171] This one thing attracted me, while I was still young, to the study of the sciences. Whenever some book promised a new discovery in its title, I would try and see, before I read any further, whether I could perhaps achieve something similar by means of a certain innate sagacity, and I was very careful that a hasty reading might not deprive me of this innocuous pleasure. So often did I succeed in doing so, that I eventually realized that I was no longer arriving at the truth of things, as others tend to do, by way of vague and blind inquiries, with the aid of luck rather than of art, but rather that I had, by means of long experience, grasped certain rules which help a lot in this. I then used these rules to devise more, and, in this way, I carefully worked out this whole method, and I convinced myself that the mode of study which I had followed from the beginning was the most useful of all.[172]

2. But, because not everyone's natural intelligence is so inclined by nature to figuring things out on its own initiative, this proposition teaches that it is necessary, not that we immediately occupy ourselves with the more difficult and arduous things, but that we first discuss the most trivial and simple arts, and those, above all, in which more order reigns, such as those of the craftsmen who weave clothes and carpets, or those of the women who embroider with needles or who weave the threads of a fabric in patterns of an infinite variety. The same holds for all number games and for whatever pertains to arithmetic, as well as for similar things, all of which exercise the natural intelligence to a surprising degree, provided that we derive their discovery, not from others, but from ourselves. For, since nothing in these activities remains hidden and they are totally adapted to the human cognitive capacity, they very distinctly exhibit to us innumerable instances of order, all different from each other and yet regular. Human sagacity consists almost entirely in the proper observance of such orders.

3. For this reason, we have advised that such things have to be investigated with method,[173] which, in these more trivial things, tends to be nothing other than the constant observance of the order which either exists in the thing itself or is subtly thought

[171] Cf. R. 2, § 1, and R. 3, § 2.
[172] Cf. AT, X, 214, for formulations remarkably similar to those of this paragraph.
[173] This is perhaps a reference to R. 4 itself.

observatio: ut si velimus legere scripturam ignotis characteribus velatam,[118] nullus quidem ordo hic apparet, sed tamen aliquem fingemus,[119] tum ad examinanda omnia prae-
[405] judicia, quae circa singulas notas, aut verba, aut sententias haberi possunt; tum | etiam ad illa ita disponenda, ut per enumerationem cognoscamus quidquid ex illis potest deduci. Et maxime cavendum est, ne in similibus casu et sine arte divinandis tempus teramus: nam etiamsi illa saepe inveniri possunt[120] sine arte, et a felicibus interdum fortasse celerius, quam per methodum, hebetarent tamen ingenii lumen, et ita puerilibus et vanis assuefacerent, ut postea semper in rerum superficiebus haereret, neque interius posset penetrare. Sed ne interim incidamus in errorem illorum, qui tantum rebus seriis et altioribus cogitationem occupant,[121] de quibus post multos labores nonnisi confusam acquirunt scientiam, dum cupiunt[122] profundam,[123] in istis igitur facilioribus primum exerceamur oportet, sed cum methodo, ut per apertas et cognitas vias, quasi ludentes ad intimam rerum veritatem semper penetrare assuescamus: nam hoc pacto sensim postea et tempore supra omnem spem brevi nos etiam aequa facilitate propositiones plures, quae valde difficiles apparent et intricatae, ex evidentibus principiis deducere posse sentiemus.

4. Mirabuntur autem fortasse nonnulli, quod hoc in loco, ubi qua ratione aptiores reddamur ad veritates unas ab aliis deducendas, inquirimus, omittamus omnia Dialecticorum praecepta, quibus rationem humanam regere se putant, dum quasdam formas disserendi praescribunt, quae tam necessario concludunt, ut illis confisa ratio, etiamsi
[406] quodammodo ferietur ab ipsius | illationis evidenti et attenta consideratione, possit tamen interim aliquid certum ex vi formae concludere: quippe advertimus elabi saepe[124] veritatem ex istis vinculis, dum interim in iisdem illi ipsi, qui usi sunt, manent irretiti. Quod aliis non tam frequenter accidit; atque experimur, acutissima quaeque sophismata neminem fere unquam pura ratione utentem, sed ipsos Sophistas fallere consuevisse.

5. Quamobrem hic nos praecipue caventes, ne ratio nostra ferietur, dum alicujus rei veritatem examinamus, rejicimus istas formas ut adversantes nostro instituto, et omnia

[118] A, AT, C, and SGZ: velatam. H: relatam.
[119] H, C, and SGZ: fingemus. A and AT: fingimus.
[120] H, AT, C, and SGZ: possunt. A: possent.
[121] H, A, AT, C, and SGZ: occupant. L: occupantur.
[122] A, AT, C, and SGZ: cupiunt. H: cupiant.
[123] C: profundam, in. H, A, AT, and SGZ: profundam. In.
[124] A, AT, C, and SGZ: elabi saepe. Missing in H. L draws a line and puts above it:]difficulter eluctari[.

out. For example, if we wish to read something written which has been veiled in an unknown cipher,[173] then surely no order is apparent here, yet we shall still feign one. We shall do this, on the one hand, in order to examine all the prejudices which we can hold about individual letters or words or sentences, and, on the other hand, in order to arrange them in such a way that we may know, by means of an enumeration, whatever can be deduced from them. And we must be careful, above all, not to waste our time by guessing about similar things at random and without art. For, even though these matters can often be found without art, and by luck sometimes even more quickly than by method, they might still dim the light of the natural intelligence and render it so accustomed to childish and vain things that it would, forever after, stick to the surfaces of things and be unable to penetrate more deeply into them. But let us, meanwhile, not fall into the error of those who occupy their thoughts only with serious and lofty matters, with respect to which they acquire, after many labors, only a confused science, while they desire a profound one.[174] Therefore, we should first acquire practice in these easier matters, but with method, in order that, through accessible and known paths, we may grow accustomed, as if playing a game, to penetrating always into the innermost truth of things. For, once we have done this, we shall perceive, gradually after having done so and in a time brief beyond all expectation, that, with equal ease, we can also deduce, from evident principles, many propositions which appear very difficult and complicated.

4. But some will perhaps be surprised that here, where we are inquiring as to how we might render ourselves more apt at deducing some truths from others, we are omitting all the precepts of the dialecticians,[175] precepts with which they think that they regulate human reason.[176] They think that they do so in that they prescribe certain forms of reasoning whose conclusions follow so necessarily that the reason which relies on them, even if it should, in a certain manner, take a holiday[177] from the evident and attentive consideration of the inference itself, could still, meanwhile, draw a conclusion which is certain by the force of the form involved. Yet we have noticed that the truth often slips through these chains,[178] while those who make use of them remain, meanwhile, themselves bound up in them, which does not happen so frequently to others. We learn from experience that the cleverest sophisms hardly ever deceive anyone using pure reason, but rather that it is the sophists themselves who have usually been deceived.[179]

5. Therefore, being on our guard, above all, that our reason not take a holiday[180] while we are examining the truth of some matter, we are here rejecting these forms as

[173] Cf. R. 7, § 9, on anagrams.
[174] On this remark in particular and this paragraph in general cf. R. 12, § 23.
[175] Cf. R. 2, § 4, R. 4, § 2, R. 10, § 5, and R. 13, § 1.
[176] Here the Latin – 'quibus rationem humanam regere se putant' – is verbatim that of R. 2, § 4.
[177] The Latin verb is 'ferior, -atus sum, -ari': to go on vacation, to take a holiday, etc.
[178] On 'chains' (*vincula*) cf. R. 2, § 4, and R. 7, § 5.
[179] Aristotle's *On Sophistical Refutations* deals with implausible arguments and how to break them. Whereas for Aristotle – despite the intimacy of the relationship between this work and the *Topics* – there is a big difference between dialectic and sophistry, for Descartes both the validity and the value of this distinction, at least when scientific knowledge is at stake, are questionable. Cf. the next paragraph.
[180] Cf. the Latin idiom of the previous paragraph.

potius adjumenta perquirimus, quibus cogitatio nostra retineatur attenta, sicut in sequentibus ostendetur. Atqui ut adhuc evidentius appareat, illam disserendi artem nihil omnino conferre ad cognitionem veritatis, advertendum est, nullum posse Dialecticos syllogismum arte formare, qui verum concludat, nisi prius ejusdem materiam habuerint, id est, nisi eandem veritatem, quae in illo deducitur, jam ante cognoverint. Unde patet, illos ipsos ex tali forma nihil novi percipere, ideoque[125] vulgarem Dialecticam omnino esse inutilem rerum veritatem investigare cupientibus, sed prodesse tantummodo interdum posse ad rationes jam cognitas facilius aliis exponendas, ac proinde
[407] illam ex Philosophia ad Rhetoricam esse transferendam.]

[125] H, AT, C, and SGZ: ideoque. A: adeoque. N: en dat dieshalven.

inimical to our project, and we are searching, instead, for all the aids[181] by means of which we may keep our thought attentive, as we shall show in the following remarks.[182] But, in order that it may be even more evidently apparent that this art of reasoning contributes nothing whatsoever to the knowledge of the truth, one has to note that the dialecticians cannot, by means of this their art,[183] form any syllogism which would enable them to infer something true, unless they already possessed the material of the same, that is, unless they already knew, beforehand, the same truth which is deduced in the syllogism.[184] It is obvious, therefore, that the dialecticians themselves learn nothing new from such a form, and hence that the vulgar dialectic is utterly useless to those who desire to investigate the truth of things,[185] but rather that this dialectic can only sometimes help to explain more easily to others arguments already known,[186] and, therefore, that it has to be transferred from philosophy to rhetoric.[187]

[181] Cf. R. 12 itself.

[182] Cf. R. 12, § 2 ff., which lists four faculties: intellect, imagination, senses, and memory.

[183] Cf. R. 2, § 4, R. 4, § 2, R. 10, § 4, and R. 13, § 1.

[184] Cf. R. 2, § 3, R. 7, § 5, R. 13, § 1, and R. 14, § 2. Of course, it is too facile to reply to this that the traditional art of the syllogism had never really been intended as an *ars inveniendi* (art of discovery), but rather only as an *ars demonstrandi* (art of demonstration). After all, both Aristotle and Aquinas recognize the distinction between deductive inference from the general to the specific and inductive inference from the individual to the specific as well as the fact that any syllogistic procedure must at some point justify all its principles (cf. both *Posterior Analytics* and *Sententia on 'Posterior Analytics'*, respectively, virtually passim). In any case, although almost any attempt to provide an answer to the question of whether the reception of the scientific methodology of Aristotle by philosophers of the Middle Ages and Renaissance was accurate would by far transcend the bounds of these annotations, it is recommended that one entertain a healthy skepticism on this point.

[185] Perhaps in the spirit of the English philosopher of science Francis Bacon de Verulam's (1561–1626) plea for a *Novum Organum* (*New Instrument*) (1620) Descartes is seeking an alternative to the traditional philosophical propaedeutic, namely, the six logical works of Aristotle's *Organon* ('instrument [of thinking]'): The *Categories* have to do with terms; *On Interpretation*, with propositions; the *Prior Analytics*, with the formal structures of syllogisms; the *Posterior Analytics*, with demonstrative syllogisms yielding knowledge; the *Topics*, with dialectical reasoning; and *On Sophistical Refutations*, with the refutation of fallacious arguments that seem to be genuine proofs but are not – 'sophistical' being those reasonings which, regardless of their fallaciousness, are undertaken to score points.

[186] In this respect, there is a remarkable parallel between Descartes' criticism of the logic of his day and his critique of the mathematics of his time. Cf., e.g., R. 4, §§ 3 and 5.

[187] Cf. *Discourse*, pt. 1, §§ 7, 9, and 12. Descartes, who displays an almost Augustinian contempt for rhetoric (*éloquence*), would relegate to this discipline, which he takes to be about persuasion, what he does not think belongs to philosophy, which he holds to be about truth. Even for an orthodox Aristotelian, of course, the distinction between the area covered by the *Topics* and that of the *Sophistical Refutations* can become fuzzy – a fact which Descartes knows how to exploit. In a broader sense, too, Descartes' critique of the *Bildung* to which he was subjected, especially the manner in which he establishes the consequential dichotomy between the *Naturwissenschaften*, e.g., physics, and the *Geisteswissenschaften*, e.g., history, would have far-reaching and less than optimal implications for the role of humanistic education in the Enlightenment. Cf. *Discourse*, pt. 1, passim, and Hans-Georg Gadamer, *Wahrheit und Methode. Grundzüge einer philosophischen Hermeneutik* (Tübingen, 1960), esp. pp. 1–39. But Descartes' general underestimation of humanistic studies would not remain authoritative for very long – cf. Giambattista Vico (1668–1744), *Le orazioni inaugurali, I–VI* (1699–1707), *De nostri temporis studiorum ratione* (1708–1709), *De antiquissima Italorum sapientia* (1710), *Principj di una scienza nuova intorno alla natura delle nazioni* (1725/1730/1744), etc.

Regula XI

De capacitate illationis

Postquam aliquot propositiones simplices sumus intuiti, si ex illis aliquid aliud concludamus, utile est easdem continuo et nullibi interrupto cogitationis motu percurrere, ad mutuos illarum[126] respectus reflectere, et plura simul, quantum fieri potest, distincte concipere: ita enim et cognitio nostra longe certior fit, et maxime augetur ingenii capacitas.

1. Hic est occasio clarius exponendi quae de mentis intuitu ante dicta sunt ad regulas tertiam et septimam: quoniam illum uno in loco deductioni opposuimus, in alio vero enumerationi tantum, quam definivimus esse illationem ex multis et disjunctis rebus collectam; simplicem vero deductionem unius rei ex altera ibidem diximus fieri per intuitum.

2. Quod ita faciendum fuit, quia ad mentis intuitum duo requirimus, nempe ut propositio clare et distincte, deinde etiam ut tota simul et non successive intelligatur. Deductio vero, si de illa facienda cogitemus[127] ut in regula tertia, non tota simul fieri videtur, sed motum quendam ingenii nostri unum ex alio inferentis involvit; atque
[108] idcirco ibi illam ab intuitu jure distinximus.[128] Si vero ad eandem, ut jam facta est. |

[126] H, C, and SGZ: illarum. A and AT: illorum.
[127] H, AT, C, and SGZ: cogitemus. A: cogitamus.
[128] H, C, and SGZ: distinximus. A and AT: distinxerimus.

Rule Eleven

On Capacity of Inference

If, after we have intuited a number of simple propositions, we want to draw some other conclusion from them, then it is useful to run through them in a continuous and completely uninterrupted movement of thought,[188] to reflect on their mutual relations, and, as far as possible, distinctly to conceive several of them together - for thus does our knowledge also become much more certain, and the capacity of the natural intelligence is increased as much as possible.

1. Here is an occasion to explain more clearly the things that have been said about mental intuition in the third rule and in the seventh rule, since, after all, we have juxtaposed it, in one place,[189] to deduction, yet, in another,[190] only to enumeration, which we have defined to be an inference gathered from many and disconnected things. But we have said, in the same place,[191] that the simple deduction of one thing from another is performed by means of intuition.

2. This we had to do thus, because we require two things for mental intuition, namely, first, that the proposition be clearly and distinctly[192] understood, and, then, that it as a whole be understood simultaneously, and not successively. Yet deduction, if we think of it as a process, as in the third rule,[193] does not seem to be accomplished all at once, but rather does it involve a certain movement of our natural intelligence, a certain movement of inferring one thing from another. There, then, we were justified in distinguishing deduction from intuition. On the other hand, if we look at deduction

[188] Cf. R. 3, § 8, R. 7, R. 7, § 1, R. 11, §§ 3–4, and R. 16, § 1.
[189] Cf. R. 3, §§ 4–9.
[190] Cf. R. 7, § 5.
[191] Cf. R. 7, § 5, where deduction fights for its autonomy versus both intuition and induction.
[192] This pairing is unique in the *Rules*. The modes of evidence 'clarity' and 'distinctness' go back at least to the roles of 'saphéneia' (clarity, distinctness, determinacy, etc.) and 'asapheia' (obscurity, vagueness, uncertainty, etc.) in the metaphors of the sun, the line, and the cave in Plato, *The Republic*, e.g., 478 e 10–11, 509 d 6–e 1, and 511 e 2–4, etc. There 'philosophy' is defined both in terms of the avoiding of obscurity or vagueness and in terms of the striving for clarity or distinctness (cf., e.g., ibid., bk. V, passim). For Descartes (as for Plato), sensation (sensual perception) yields vague and obscure impressions, whereas intellection (mental perception) provides clear and distinct ideas. In this regard, the paradigm shift from rationalism to empiricism is obvious at the latest with Hume, for whom the ideas of thought are relatively dull and weak, while the impressions of sensation are relatively lively and vivacious (cf. *Enquiry concerning Human Understanding*, passim, esp. sec. II). On the Stoic notion of the clear and distinct cognitive impression (that apprehends its object: *hē katalēptikē phantasia*) as the criterion of truth (*to kritērion tēs alētheias*), on the other hand, cf., e.g., *Stoicorum Veterum Fragmenta*, vol. I, frags. 105–121, and vol. II, frags. 52–73. On Cicero's reaction to this doctrine cf., e.g., *Academica*, bk. I, chs. 140–141, and bk. II, chs. 22, 30–31, 37–38, 57, 77–78, and 83–85. On the critical reception of the doctrine cf., e.g., Diogenes Laertius, *Collection of Lives and Opinions of the Philosophers*, bk. VII, chs. 46, 52, 54, and 177. On the skeptical rejection of the doctrine cf., e.g., Sextus Empiricus, *Against the Professors*, bk. VII, chs. 247–260, 402–410, 424, and bk. VIII, 331 a–332 a. On the discussion of the problem of the criterion between Stoic foundationalism and Pyrrhonian skepticism, which experienced a renaissance in the late sixteenth and early seventeenth centuries, cf., e.g., Montaigne, 'An apology for Raymond Sebond' (*Essais*, bk. II, ch. 12), virtually passim. Finally, on rhetorical 'clarity' and 'distinctness' cf. AT, I, 7–11, and Lausberg, *Handbuch der literarischen Rhetorik*, §§ 427, 460, 463, 531, 813, and 844–845.
[193] There, as well as here, deduction in this sense appears to reduce to induction – cf. R. 7, § 5.

attendamus, sicut in dictis ad regulam septimam, tunc nullum motum amplius designat, sed terminum motus, atque ideo illam per intuitum videri supponimus, quando est simplex et perspicua, non autem quando est multiplex et involuta; cui enumerationis, sive inductionis nomen dedimus, quia tunc non tota simul ab intellectu potest comprehendi, sed ejus certitudo quodammodo a memoria dependet, in qua judicia de singulis partibus enumeratis retineri debent, ut ex illis omnibus unum quid colligatur.

3. Atque haec omnia ad hujus regulae interpretationem erant distinguenda: nam postquam nona egit de intuitu mentis tantum, decima de enumeratione sola, haec explicat, quo pacto hae duae operationes se mutuo juvent et perficiant, adeo ut in unam videantur coalescere, per motum quendam cogitationis singula attente intuentis simul et ad alia transeuntis.

4. Cujus rei duplicem utilitatem designamus, nempe ad conclusionem, circa quam versamur, certius cognoscendam, et ad ingenium aliis inveniendis aptius reddendum. Quippe memoria, a qua pendere dictum est certitudinem conclusionum, quae plura complectuntur quam uno intuitu capere possimus, cum labilis sit et infirma, revocari debet et firmari per continuum hunc et repetitum cogitationis motum: ut si per plures operationes cognoverim primo, qualis sit habitudo inter magnitudines primam et
[409] secundam, deinde inter secundam et tertiam, tum inter tertiam et quartam, | ac denique inter quartam et quintam, non idcirco video qualis sit inter primam et quintam, nec possum deducere ex jam cognitis, nisi omnium recorder; quamobrem mihi necesse est illas iterata cogitatione percurrere, donec a prima ad ultimam tam celeriter transierim,[129] ut fere nullas memoriae partes relinquendo rem totam simul videar intueri.

5. Qua quidem ratione ingenii tarditatem emendari nemo non videt, et illius etiam amplificari capacitatem.[130] Sed insuper advertendum est, maximam hujus regulae utilitatem in eo consistere, quod ad mutuam simplicium propositionum dependentiam reflectendo, usum acquiramus subito distinguendi, quid sit magis[131] vel minus respectivum, et quibus gradibus ad absolutum reducatur. Ex. gr., si percurram aliquot magnitudines continue proportionales, ad haec omnia reflectam: nempe, pari conceptu et non magis vel minus facile me agnoscere habitudinem inter primam et secundam,

[129] H, A, AT, C, and SGZ: transierim ... etiam. Between 'transierim ... intueri' and 'Qua ... etiam' L reads: non semper hoc facile, nempe in modo quodam curvarum, ubi ex duabus ordinatis 3^{tia} datur, ubi non semper pervenitur ad absolutam clavem ut in linea logarithmorum.

[130] AT, C, and SGZ: capacitatem. H and A: conceptum. N: bevatting.

[131] A, AT, C, and SGZ: magis ... si. Missing in H. L notes, but does not fill, the lacuna. There are several lacunae in the text of this paragraph according to H, and L does not appear to have had much to go on in order to fill them.

as an achievement already completed, as in the things said in the seventh rule,[194] then it no longer signifies a movement, but rather the completion of a movement. We are supposing, therefore, that the deduction is seen through intuition when it is simple and perspicuous, but not when it is multifaceted and complex. To the latter, we have given the name 'enumeration' or 'induction', because then it cannot be comprehended all at once by the intellect, but rather does its certainty depend, in a certain manner, on the memory, which must retain the judgments about the individually enumerated parts in order that we may gather one thing from them all.

3. For the interpretation of this rule, all these things had to be distinguished. For, after the ninth rule treated of mental intuition only, and the tenth rule dealt with enumeration alone,[195] the present rule explains how these two operations assist and complement one another, so much so, that, through a certain movement of thought, a movement of intuiting individuals attentively and of passing on at once to others, they might seem to coalesce into a single operation.

4. We should point out the dual utility of this matter, namely, that the conclusion with which we are concerned is known more certainly, and that the natural intelligence is rendered more apt at discovering other things. Of course, since the memory – on which depends, as we have said,[196] the certainty of those conclusions which encompass more things than we can grasp by means of a single intuition – is weak and unstable, it must be refreshed and strengthened through this continuous and repeated movement of thought.[197] For instance, if, through several operations, I have recognized, first, what the relation is between a first magnitude and a second, then, between the second and a third, and between the third and a fourth, and, finally, between the fourth and a fifth, then I do not, without further ado, see what the relation is between the first and the fifth magnitudes, nor am I able to deduce it from the relations already known, unless I remember all of them. For this reason, it is necessary for me to run through them, in thought, again and again, until I can pass from the first to the last so quickly that, by relinquishing almost no part to the memory to play,[198] I seem to be intuiting the whole thing at once.[199]

5. To be sure, everyone sees that, in this way, the sluggishness of the natural intelligence is emended and its capacity is even amplified.[200] None the less, one has to note, in addition, that the greatest utility of this rule consists in the fact that, by reflecting on the mutual dependence of simple propositions, we acquire the habit of distinguishing, at a glance, what is more and what is less relative, and by which steps the relative may be reduced to the absolute. For example, if I run through a number of magnitudes which are continued proportionals,[201] then I reflect on all the following points: namely, that I recognize, by means of a similar conception,[202] and neither more nor less

[194] There, as well as here, deduction in this sense appears to amount to intuition – cf. R. 7, § 5.

[195] But, according to R. 9, § 1, R. 10 does not deal with enumeration, but rather with deduction and the sagacity corresponding to it. Still, see R. 10, § 3.

[196] Cf. § 2 of this rule as well as R. 3, § 8.

[197] Cf. R. 3, § 8, R. 4, § 6, and R. 7, § 1.

[198] In R. 16, § 1, the main aim is also to reduce the importance of the role of the memory.

[199] Cf. the strikingly similar formulation in R. 7, § 1.

[200] Cf., once again, the strikingly similar formulation in R. 7, § 1.

[201] Cf. R. 6, §§ 7–9, with the example of the continued proportionals: 3, 6, 12, 24, and 48.

[202] Cf. R. 3, § 5.

secundam et[132] tertiam, tertiam et quartam, et caetera; non autem me posse tam facile concipere, qualis sit dependentia secundae a prima et tertia simul, et adhuc multo difficilius ejusdem secundae a prima et quarta, et caetera. Ex quibus deinde cognosco, quam ob causam, si datae sint prima et secunda tantum, facile possim invenire tertiam et quartam, etc.,[133] quia scilicet hoc fit per conceptus particulares et distinctos. Si vero
[410] datae sint prima et tertia[134] tantum, non tam facile | mediam agnoscam, quia hoc fieri non potest, nisi per conceptum, qui duos ex prioribus simul involvat. Si prima et quarta solae[135] sint datae, adhuc difficilius duas medias intuebor, quia hic tres simul conceptus implicantur, adeo ut ex consequenti etiam difficilius videretur ex prima et quinta tres medias invenire. Sed alia ratio est quare aliter contingat, quia scilicet, etiamsi hic quatuor conceptus simul juncti sint, possunt[136] tamen separari, cum quatuor per alium numerum dividatur; adeo ut possim quaerere tertiam solam ex prima et quinta, deinde secundam ex prima et tertia, etc. Ad quae et similia qui reflectere consuevit, quoties novam quaestionem examinat, statim agnoscit, quid in illa pariat difficultatem, et quis sit omnium simplicissimus [solvendi][137] modus; quod maximum est ad veritatis cognitionem adjumentum.

Regula XII

De vi et operationibus ingenii

Denique omnibus utendum est intellectus, imaginationis, sensus, et memoriae auxiliis, tum ad propositiones simplices distincte intuendas, tum ad quaesita cum cognitis rite comparanda[138] ut agnoscantur, tum ad illa invenienda, quae ita inter se debeant conferri, ut nulla pars humanae industriae omittatur.

[411] 1. Haec regula concludit omnia quae supra dicta sunt, et docet in genere quae in particulari erunt[139] explicanda hoc pacto.

2. Ad rerum cognitionem duo tantum spectanda sunt, nos scilicet qui cognoscimus, et res ipsae cognoscendae. In nobis quatuor sunt facultates tantum, quibus ad hoc uti

[132] A, AT, C, and SGZ: et ... dependentia. Missing in H. L notes the lacuna.
[133] C and SGZ: etc. A and AT: et caetera. Missing in H.
[134] A, AT, C, and SGZ: tertia ... prima et. Missing in H, which reads: n^{a} et 4^{a}. L notes the lacuna.
[135] A, AT, C, and SGZ: solae. H: solo.
[136] A, AT, C, and SGZ: possunt ... ut. Missing in H.
[137] AT and C: [solvendi]. Missing in H, in A, and in SGZ.
[138] H, C, and SGZ: comparanda. A and AT: componenda. N: te vergelijken.
[139] H, C, and SGZ: erunt. A and AT: eruut.

easily, the relation between the first and the second magnitudes, between the second and the third, between the third and the fourth, et cetera; but that I cannot as easily conceive what the dependence is of the second magnitude on the first and the third magnitudes together, and, much more difficult still, of the same second on the first and the fourth, et cetera. From these considerations, I know why, if only the first and the second magnitudes are given, I can then easily find the third and the fourth, et cetera, namely, because this happens by means of particular and distinct conceptions. On the other hand, if only the first and the third magnitudes are given, then I will not so easily recognize the intermediate magnitude, because this can be done only by means of a conception which simultaneously involves two of the previous conceptions. If the first and the fourth magnitudes alone are given, then it will be even more difficult for me to intuit the two intermediate ones, because three conceptions are simultaneously involved here. This is so much so, that, as a consequence, it might seem even more difficult to find the three intermediate magnitudes from the first and the fifth. Yet this is not the case, and there is a different reason why not, namely, because, although four conceptions are joined together here, they can still be separated, since four is divisible by another number. And this is so much so, that I can obtain the third magnitude alone from the first and the fifth magnitudes, then the second from the first and the third, et cetera. Whoever is accustomed to reflecting on these and similar matters, whenever he examines a new question, immediately recognizes what is causing the difficulty there and what is the simplest way of resolving it. And that is the greatest aid to the knowledge of the truth.

Rule Twelve

On the Power and Operations of the Natural Intelligence

Finally, one must use all the aids[203] of the intellect, of the imagination, of the senses, and of the memory: first, in order to intuit simple propositions distinctly; second, in order to compare correctly the matters being investigated with those already known, so that one may recognize the former; and, third, in order to discover those things which should be so compared with one another that no part of human industry is omitted.

1. This rule concludes all the things that have been said above.[204] It also teaches in general[205] the things that will have to be explained in detail[206] – in the following way.

2. With respect to knowledge of things, only two factors have to be considered,[207] namely, we ourselves, who know, and the things themselves, which are to be known.[208] In us, there are only four faculties which we can use for this purpose,

[203] Cf. R. 10, § 5. These aids are intended to replace the precepts of the dialecticians which supposedly govern human reason in its search for the truth by means of formal-syllogistic reasoning.
[204] This is an indication that this rule is intended to conclude the first unit of twelve rules.
[205] 'It' being, of course, the rule itself which has just been formulated.
[206] This, the program of R. 12, passim, looks a lot like the one outlined in R. 8, §§ 8–10.
[207] Cf. R. 8, § 8, for essentially the same distinction. Cf. also R. 8, § 10, and R. 6, § 1.
[208] Cf. § 3 ff. and § 12 ff., respectively, of the present rule.

possimus, nempe intellectus, imaginatio, sensus, et memoria: solus intellectus equidem percipiendae veritatis est capax, qui tamen juvandus est ab imaginatione, sensu, et memoria, ne quid forte, quod in nostra industria positum sit, omittamus. Ex parte rerum tria examinare sufficit, nempe id primum quod sponte obvium est, deinde quomodo unum quid ex alio cognoscatur, et denique[140] quaenam ex quibusque deducantur. Atque haec enumeratio mihi videtur completa,[141] nec ulla prorsus omittere, ad quae humana industria possit extendi.

3. Ad primum itaque me convertens, optarem exponere hoc in loco, quid sit mens hominis, quid corpus, quomodo hoc ab illa informetur, quaenam sint in toto composito facultates rebus cognoscendis inservientes, et quid agant singulae, nisi nimis angustus mihi videretur ad illa omnia capienda, quae praemittenda sunt, antequam harum rerum veritas possit omnibus patere. Cupio enim semper ita scribere, ut nihil asseram
[412] ex iis, quae in controversiam adduci soleant, nisi praemiserim easdem rationes, quae me eo deduxerunt, et quibus existimo alios etiam posse persuaderi.

4. Sed quia jam hoc non licet, mihi sufficiet quam brevissime potero explicare, quisnam modus concipiendi illud omne, quod in nobis est ad res cognoscendas, sit maxime utilis[142] ad meum institutum. Neque credetis, nisi lubet, rem ita se habere; sed quid impediet, quominus easdem suppositiones sequamini, si appareat, nihil illas ex rerum veritate minuere, sed tantum reddere omnia longe clariora? Non secus quam in Geometria quaedam de quantitate supponitis, quibus nulla ratione demonstrationum vis infirmatur, quamvis saepe aliter in Physica de ejus natura sentiatis.

5. Concipiendum est igitur primo, sensus omnes externos, in quantum sunt partes corporis, etiamsi illos applicemus ad objecta per actionem, nempe per motum localem, proprie tamen sentire per passionem tantum, eadem ratione qua cera recipit figuram a sigillo. Neque hoc per analogiam dici putandum est, sed plane eodem modo concipiendum, figuram externam corporis sentientis realiter mutari ab objecto, sicut illa, quae est in superficie cerae, mutatur a sigillo. Quod non modo admittendum est, cum tangimus aliquod corpus ut figuratum, vel durum, vel asperum, etc., sed etiam cum tactu percipimus calorem, vel frigus, et similia. Item in aliis sensibus, nempe primum opacum, quod est in oculo, ita recipere figuram impressam ab illuminatione variis

[140] H, AT, C, and SGZ: denique. A: deinde. N: eindelijk.
[141] A, AT, C, and SGZ: completa. H: complecta. L: omnia complecti.
[142] A, AT, C, and SGZ: utilis … habere. Missing in H. L adds: aptus.

namely, the intellect,[209] the imagination,[210] the senses,[211] and the memory.[212] Of course, only the intellect is capable of perceiving the truth; still, if we are not perhaps to omit something which lies within our industry, then the intellect has to be assisted by the imagination, by the senses, and by the memory.[213] On the side of the things to be known, it suffices to examine three matters, namely, first, what is spontaneously accessible, then, how one thing may be known from another, and, finally, which things may be deduced from which things. This enumeration seems to me to be complete and to omit nothing at all to which human industry can extend.

3. Turning to the first factor, therefore, I would like to explain, in this place, what the mind of the human being is, what the body is, how the body is informed[214] by the mind, which are the faculties within the composite whole[215] which serve to promote knowledge of things, and what the individual faculties do – except that there does not seem to me to be enough space here to include all the things that have to be set forth before the truth about these matters can become accessible to all. For I desire always to write in such a way that I assert nothing which tends to lead to controversy, unless I have set forth the reasons which led me to do so, and which, I think, can also convince others.

4. But, because this is not now possible, it will suffice if I can explain, as briefly as possible, which, for my project, is the most useful manner of conceiving all that which is within us for the things to be known. Nor should you believe, unless you want to do so, that that's the way it is. Yet what will prevent you from following these suppositions if it is apparent that they do not detract anything from the truth of things, but that they rather only render all things much clearer? This is no different from what you do in geometry – you assume certain things about quantity[216] which in no way diminish the force of the demonstrations, even though, in physics, you often feel differently about the nature of quantity.[217]

5. One has, then, to conceive, first, that all the external senses, in so far as they are parts of the body, even if we do apply them to objects by means of an activity, namely, by means of local motion, still sense, strictly speaking, merely by means of passivity, in the same way in which wax receives an impression from a seal. Nor should one think that this is said merely by way of analogy; rather, one must conceive that the external shape of the sentient body is really changed by the object in exactly the same way as the shape of the surface of the wax is changed by the seal. This must be admitted, not only when we are touching some body as shaped or hard or rough, et cetera, but also when, by means of touch, we are perceiving heat or cold and the like. The same is true of the other senses, namely, thus does the first opaque membrane in the eye receive the shape impressed upon it by the light endowed with various colors, and thus too does

[209] Cf. R. 13.
[210] Cf. R. 14.
[211] Cf. R. 15.
[212] Cf. R. 16.
[213] On the unity of Rs. 13–16 cf. R. 16, § 7, which ties them all together.
[214] This Scholastic term expresses the Aristotelian conception that the soul, as the 'principle of life', is the 'entelechy' and 'form' of the body. Cf. Aristotle, *On the Soul*, esp. bks. II and III, chs. 1–5.
[215] Cf. *Meditations*, M. VI, §§ 14–15, 18, and 23.
[216] E.g., the infinite divisibility of quantity. Cf. R. 14, § 14.
[217] Cf. the strikingly similar remark in the second part of this rule: § 12.

[413] coloribus induta, et primam[143] au |rium, narium, et linguae cutem, objecto imperviam, ita novam quoque figuram mutuari a sono, odore, et sapore.

6. Atque haec omnia ita concipere multum juvat, cum nihil facilius sub sensum cadat quam figura: tangitur enim et videtur. Nihil autem falsum ex hac suppositione magis quam ex alia quavis sequi, demonstratur ex eo, quod tam communis et simplex sit figurae conceptus, ut involvatur in omni sensibili. Verbi gratia, colorem supponas[144] esse quidquid vis, tamen eundem extensum esse non negabis, et per consequens figuratum. Quid igitur sequetur incommodi, si, caventes ne aliquod novum ens inutiliter admittamus et temere fingamus, non negemus quidem de colore quidquid aliis placuerit, sed tantum abstrahamus ab omni alio, quam quod habeat figurae naturam, et concipiamus diversitatem, quae est inter album, coeruleum, rubrum, etc., veluti illam, quae est inter has aut similes figuras, etc.?

Idemque de omnibus dici potest, cum figurarum infinitam multitudinem omnibus rerum sensibilium differentiis exprimendis sufficere sit certum.

[414] 7. Secundo concipiendum est, dum sensus externus | movetur ab objecto, figuram quam recipit deferri ad aliam quandam corporis partem, quae vocatur sensus communis, eodem instanti et absque ullius entis[145] reali transitu ab uno ad aliud: plane eodem modo, quo nunc, dum scribo, intelligo eodem instanti quo singuli characteres in charta exprimuntur, non tantum inferiorem calami partem moveri, sed nullum in hac vel minimum motum esse posse, quin simul etiam in toto calamo recipiatur; atque illas omnes motuum diversitates etiam a superiori ejus parte in aëre designari, etiamsi nihil reale ab uno extremo ad aliud transmigrare concipiam. Quis enim putet minorem esse connexionem inter partes corporis humani, quam inter illas calami, et quid simplicius excogitari potest ad hoc exprimendum?

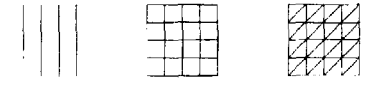
[143] AT, C, and SGZ: primam. H and A: primum. N (phrase): en vooreerst, dat de huit der oren, neusgaten, en tong.

[144] A, AT, C, and SGZ: supponas. H: suppones.

[145] A, AT, C, and SGZ: ullius entis. H: ulligentis. L: intelligentis. N: enig wezend.

the first membrane in the ears, in the nose, and in the tongue, impervious to the object, acquire a new shape from the sound, from the smell, and from the flavor, respectively.

6. To conceive all these things in this way is a big help, since nothing is more readily available to the senses than shape, for it is both touched and seen. But, that nothing false follows from this supposition more than from any other one, is demonstrated by the fact that the concept of shape is so common and so simple that it is involved in everything sensible. For example, you may suppose color to be whatever you like; still, you will not deny that it is extended, and, as a consequence, shaped. What disadvantage will follow, then, if – being careful that we do not uselessly admit and blindly feign some new entity,[218] and, of course, that we do not deny what others have found appealing about color[219] – we rather merely abstract from everything about color except that it possesses the nature of shape, and we conceive the difference between white, blue, red, et cetera, as being like that between these figures or similar ones, et cetera?[220]



The same can be said about all things, since it is certain that the infinite multitude of shapes suffices for expressing all the differences of sensible things.[221]

7. One has to conceive, second, that, when an external sense is stimulated by an object, the figure which it receives is instantaneously conveyed to another part of the body, which is called 'the common sense',[222] without the passage of any real entity from the one to the other. In exactly the same way, I understand that now, while I am writing, at the same instant at which the individual letters are being expressed on the paper, not only is the lower part of the pen being moved, but there also cannot be even the slightest motion in this part unless that motion is being simultaneously transmitted to the whole pen as well; and I understand that all these differences of motions are also being traced out in the air by the higher part of the pen, even though I do not conceive that anything real is passing from the one end of the pen to the other. For who would think that there is less connection between the parts of the human body than there is between the parts of a pen? And can one think of a simpler way of expressing this?

[218] Cf. § 24 of this rule as well as R. 14, §§ 1 and 15.

[219] On Descartes' concept of color cf. *Dioptrics*, AT, VI, 85: 'In the bodies which one calls "colored", the colors are nothing other than the diverse manners in which these bodies receive light and reflect it against our eyes.' Cf. also AT, VIII/1, 79, as well as *Principles*, pt. I, § 70.

[220] Cf. *Dioptrics*, Discourse 5.

[221] In R. 14, § 20, there is a reference back to this spot.

[222] This terminus technicus reflects the Aristotelian-Scholastic notion that there is an internal sense which receives and coordinates the data of the external senses. Cf. Aristotle, *On the Soul*, 425 a 14 (bk. III, ch. 1); Aquinas, *Sententia in librum De anima*; and Descartes, *Meditations*, M. VI, § 20.

8. Tertio concipiendum est, sensum communem fungi etiam vice sigilli ad easdem figuras vel ideas, a sensibus externis puras et sine corpore venientes, in phantasia vel imaginatione veluti in cera formandas; atque hanc phantasiam esse veram partem corporis, et tantae magnitudinis, ut diversae ejus portiones plures figuras ab invicem distinctas induere possint, illasque diutius[146] soleant retinere: tuncque eadem est quae memoria appellatur.

9. Quarto concipiendum est, vim motricem sive ipsos nervos originem suam ducere a cerebro, in quo phantasia est, a qua illi diversimode moventur, ut sensus communis a sensu externo, sive ut totus calamus a parte sui inferiore. Quod exemplum etiam ostendit, [415] quomodo phantasia possit esse causa multorum motuum in nervis, quorum tamen imagines non habeat in se expressas, sed alias quasdam,[147] ex quibus isti motus consequi possint: neque enim totus calamus movetur, ut pars ejus inferior; quinimo, secundum majorem sui partem, plane diverso et contrario motu videtur incedere. Atque ex his intelligere[148] licet, quomodo fieri possint omnes aliorum animalium motus, quamvis in illis nulla prorsus rerum cognitio, sed phantasia tantum pure corporea admittatur; item etiam, quomodo fiant in nobis ipsis omnes[149] operationes illae, quas peragimus[150] absque ullo ministerio rationis.

10. Quinto denique concipiendum est, vim illam, per quam res proprie cognoscimus, esse pure spiritualem, atque a toto corpore non minus distinctam, quam sit sanguis ab osse, vel manus ab oculo; unicamque esse, quae vel accipit figuras a sensu communi simul cum phantasia, vel ad illas, quae in memoria servantur, se applicat, vel novas formar, a quibus imaginatio ita occupatur, ut saepe simul non sufficiat ad ideas a sensu communi accipiendas, vel ad easdem ad vim motricem juxta puri corporis dispositionem[151] transferendas. In quibus omnibus haec vis cognoscens interdum patitur, interdum agit, et modo sigillum, modo ceram imitatur; quod tamen per analogiam tantum hic est sumendum, neque enim in rebus corporeis aliquid omnino huic simile invenitur. Atque una et eadem est vis, quae, si applicet se cum imaginatione ad sensum

[146] A, AT, C, and SGZ: diutius. Missing in H. N: langer.
[147] A, AT, C, and SGZ: alias quasdam. H: alios quosdam.
[148] A, AT, C, and SGZ: intelligere … quamvis. Missing in H. L: [patet quomodo].
[149] H, A, AT, and C: omnes. Missing in SGZ. N: alle.
[150] H, AT, C, and SGZ: peragimus. A: percipimus.
[151] AT, C, and SGZ: dispositionem. H and A: dispensationem. N: schicking.

8. One has to conceive, third, that the common sense also functions like a seal, in order to form, in the fantasy or in the imagination,[223] as if in wax, the same figures or ideas which come, purely and without body,[224] from the external senses; that this fantasy is a genuine part of the body; and that it is of such magnitude that its different parts are able to take on many figures distinct from each other,[225] and, usually, to retain them for some time – in which case it is what is called the 'memory'.[226]

9. One has to conceive, fourth, that the motive force, or the nerves themselves, derive their origin from the brain, in which the fantasy is located, by which fantasy the nerves are moved in different ways, as the common sense is moved by the external senses, or as the whole pen is moved by its lower part. This example also shows how the fantasy can be the cause of many movements in the nerves, even though it may have within it, not the express images of these movements, but certain other images from which these movements can follow. For neither does the whole pen move as does its lower part; on the contrary, according to its upper part, it seems to have quite a different and contrary movement. And, from these considerations, one can understand how all the movements of the other animals can occur, even though one admits in these animals no knowledge at all of things, but only a purely corporeal fantasy.[227] From the same considerations, one can also understand how all those operations occur within ourselves which we perform without any help from reason.

10. Finally, one has to conceive, fifth, that the power through which we know things, in the strict sense, is purely spiritual: that it is no less distinct from the whole body than blood is from bone, or than the hand is from the eye; and that it is one single power, which either receives figures from the common sense at the same time as does the fantasy, or applies itself to those which are preserved in the memory, or forms new ones which so preoccupy the imagination that it is often unable, at the same time, to receive ideas from the common sense, or to transfer them to the motive force in accordance with the disposition of the pure body. In all these functions, this cognitive power is sometimes passive, sometimes active; it resembles sometimes the seal, sometimes the wax. But here this is to be taken merely as an analogy,[228] for nothing quite like this power is found in corporeal things. And it is one and the same power,[229]

[223] On the one hand, Descartes often uses the terms 'phantasia' and 'imaginatio' synonymously; on the other hand, he uses the former more often than the latter when speaking in a physiological mode, e.g., when referring to the part of the brain in which the physical processes associated with imagining take place – cf. the next paragraph. Note well that 'phantasia' in the Classical sense, which mainly and mostly has to do with picturing to oneself that which has been but is not presently given to the senses, is very different from 'fantasy' in the contemporary sense, which mainly and mostly involves imagining all kinds of things that are not, never were, and never could be. The same holds for 'imaginatio' and 'imagination'.
[224] Alternatively translated: '… purely and incorporeally …'. Cf. R. 9, § 5.
[225] In R. 14, § 6, there is a reference back to this spot.
[226] R. 8, § 5, posits two other cognitive faculties besides the intellect, i.e., the fantasy and the senses. This paragraph provides some justification for this view. On the other hand, according to R. 8, § 9, and R. 12, § 2, there are three other cognitive faculties besides the intellect, i.e., the imagination, the senses, and the memory. The issue is whether to emphasize or to deemphasize the function of the memory as an independent cognitive faculty. Cf. § 11 of this rule.
[227] Cf., once again, *Discourse*, pt. V, § 11.
[228] 'Here', i.e., as distinguished from the appeal to the analogy in § 5 of this rule.
[229] The unity of the *ingenium* bestows unity upon the sciences. Cf. R. 1, § 1.

[416] communem, dicitur videre, tangere, etc.; si ad imaginationem solam ut diversis figuris indutam, dicitur reminisci; si ad eandem ut novas fingat, dicitur imaginari vel concipere; si denique sola agat, dicitur intelligere: quod ultimum quomodo fiat, fusius exponam suo loco. Et eadem etiam idcirco juxta has functiones diversas vocatur vel intellectus purus, vel imaginatio, vel memoria, vel sensus; proprie autem ingenium appellatur, cum modo ideas in phantasia novas format, modo jam factis incumbit; consideramusque illam ut diversis istis operationibus aptam, atque horum nominum distinctio erit in sequentibus observanda. His[152] autem omnibus ita conceptis, facile colliget attentus Lector, quaenam petenda sint ab unaquaque facultate auxilia, et quousque hominum industria ad supplendos ingenii defectus possit extendi.

11. Nam cum intellectus moveri possit ab imaginatione, vel contra agere in illam; item imaginatio agere possit in sensus per vim motricem illos applicando ad objecta, vel contra ipsi in illam, in qua scilicet corporum imagines depingunt; memoria vero, illa saltem quae corporea est et similis recordationi brutorum, nihil sit ab imaginatione distinctum: certo concluditur, si intellectus de illis agat, in quibus nihil sit corporeum vel corporeo simile, illum non posse ab istis[153] facultatibus adjuvari; sed contra, ne ab iisdem impediatur, esse arcendos sensus, atque imaginationem, quantum fieri poterit, omni impressione distincta exuendam. Si vero intellectus examinandum aliquid sibi
[417] proponat, quod referri possit ad corpus, ejus idea, quam distinctissime poterit, in imaginatione est formanda; ad quod commodius praestandum, res ipsa, quam haec idea repraesentabit, sensibus externis est exhibenda. Neque plura intellectum juvare possunt ad res singulas distincte intuendas. Ut vero ex pluribus simul collectis[154] unum quid deducat, quod saepe faciendum est, rejiciendum est ex rerum ideis quidquid praesentem attentionem non requiret, ut facilius reliqua possint in memoria retineri; atque eodem modo, non tam[155] res ipsae sensibus externis erunt proponendae, sed potius compendiosae quaedam illarum figurae, quae, modo sufficiant ad cavendum memo-

[152] H, AT, C, and SGZ: His. A: Hic.
[153] H, A, AT, and C: istis. SGZ: illis.
[154] H, C, and SGZ: simul collectis. Missing in A and in AT. N: te zamen vergadert.
[155] L and C: tam. H, A, AT, and SGZ: tunc.

which, if it applies itself, along with the imagination, to the common sense, is said 'to see', 'to touch', et cetera; which, if it applies itself to the imagination alone, in so far as the latter is endowed with various figures, is said 'to remember'; which, if it applies itself to the imagination in order to feign new figures, is said 'to imagine' or 'to conceive'; and, finally, which, if it acts alone, is said 'to understand'. How this last operation, understanding, comes about, I shall explain in greater detail in the appropriate place.[230] According to these different functions, then, the same power is also called either 'pure intellect' or 'imagination' or 'memory' or 'sense-perception'. But it is called 'natural intelligence', in the proper sense, when it is forming new ideas in the fantasy or when it is getting involved with those already made. We are regarding this power as apt at performing these different operations, and the distinctions between these terms will have to be observed in the following remarks.[231] But, once the attentive reader has thus conceived all these matters, he will easily gather what aids are to be sought from each particular faculty, and how far human industry can be extended in order to supplement the defects of natural intelligence.[232]

11. For the intellect can either be stimulated by the imagination or act upon it; likewise, the imagination can act upon the senses through the motive force, by applying them to objects, or the senses can, on the other hand, act upon the imagination, upon which, namely, they depict the images of bodies; yet the memory, at least that memory which is corporeal and similar to the recollection of animals, is not something distinct from the imagination.[233] Due to these considerations, one can conclude with certainty that, if the intellect is dealing with those matters in which nothing is corporeal or similar to the corporeal, then it cannot be helped by these faculties. Rather, in order that it might not be hindered by them, the senses have to be kept back, and the imagination has to be divested, as far as possible, of every distinct impression. On the other hand, if the intellect proposes to examine something which can be referred to the body, then the idea of that thing has to be formed as distinctly as possible in the imagination.[234] And, in order to accomplish this more conveniently, the thing itself, which this idea will represent, has to be displayed to the external senses.[235] Nor can many things aid the intellect in distinctly intuiting individual things. Rather, in order that it might deduce one thing from many things gathered together, which must often be done, one has to discard, from the ideas of the things, whatever does not require one's present attention, in order that the remaining aspects may be more easily retained in the memory. In the same way, it is not so much the things themselves, as rather certain abbreviated representations of them, which are to be presented to the external senses. And, the

[230] If this is accomplished in the *Rules* at all, then it is probably done in § 14 ff. of this rule.
[231] § 11, the last paragraph of the first part of this rule, anticipates Rs. 14–16.
[232] This is yet another way of saying that 'art improves upon nature'. Cf. R. 9, § 4.
[233] Cf. § 8 of this rule. On the one hand, in physiological contexts Descartes does describe the memory in corporeal terms (cf., e.g., AT, XI, 202). On the other hand, in connection with human knowledge he argues that it is an 'intellectual memory' which makes it possible to remember such things as concepts and meanings (cf., e.g., AT, V, 150). Finally, the *Rules* are acutely aware of 'the weakness of memory' and advocate reducing reliance on remembering as much as possible – by means of 'a continuous and completely uninterrupted movement of thought' (cf., e.g., R. 7, §§ 1–2).
[234] This appears to be the task of R. 14.
[235] This appears to be the task of R. 15.

riae[156] lapsum, quo breviores, eo commodiores existent.[157] Atque haec omnia quisquis observabit, nihil omnino mihi videbitur eorum, quae ad hanc partem pertinent, omisisse.

12. Jam ut quoque secundum aggrediamur, et ut accurate distinguamus simplicium rerum notiones ab illis[158] quae ex iisdem componuntur, ac videamus in utrisque, ubinam falsitas esse possit, ut caveamus, et quaenam certo possint cognosci, ut his solis incumbamus: hic loci, quemadmodum in superioribus, quaedam assumenda sunt, quae fortasse non apud omnes sunt in confesso; sed parum refert, etsi non magis vera esse credantur, quam circuli illi imaginabiles, quibus Astronomi phaenomena sua describunt, modo illorum ope, qualis de qualibet re cognitio vera esse possit aut falsa, distin-
[418] guatis.|

13. Dicimus igitur primo, aliter spectandas esse res singulas in ordine ad cognitionem nostram, quam si de iisdem loquamur prout revera existunt. Nam si, ver. gr., consideremus aliquod corpus extensum et figuratum, fatebimur quidem illud, a parte rei, esse quid unum et simplex: neque enim, hoc sensu, compositum dici posset ex natura corporis, extensione, et figura, quoniam hae partes nunquam unae ab aliis distinctae exstiterunt; respectu vero intellectus nostri, compositum quid ex illis tribus naturis appellamus, quia prius singulas separatim intelleximus, quam potuimus[159] judicare, illas tres in uno et eodem subjecto simul inveniri. Quamobrem hic nos de rebus non agentes, nisi quantum ab intellectu percipiuntur, illas tantum simplices vocamus, quarum cognitio tam perspicua et distincta est, ut in plures magis distincte cognitas mente dividi non possint: tales sunt figura, extensio, motus, etc.; reliquas autem omnes quodammodo ex his compositas esse concipimus. Quod adeo generaliter est sumendum, ut nequidem excipiantur illae, quas interdum ex simplicibus ipsis abstrahimus: ut fit, si dicamus figuram esse terminum rei extensae, concipientes per terminum aliquid magis generale quam per figuram, quia scilicet dici potest etiam terminus durationis, terminus motus, etc. Tunc enim, etiamsi termini significatio a figura abstrahatur, non tamen
[419] ideirco magis simplex videri debet quam sit figura; sed potius, cum | aliis etiam

[156] H, AT, C, and SGZ: memoriae. Missing in A.
[157] H, AT, C, and SGZ: existent. A: existunt.
[158] H, C, and SGZ: illis. A and AT: istis.
[159] A, AT, C, and SGZ: potuimus. H: potuerimus.

more compact these abbreviated representations are, the more convenient they are, provided that they suffice to prevent lapses of memory.[236] Whoever observes all these points will, it seems to me, have omitted nothing at all pertaining to this part.[237]

12. Turning now to the second factor with respect to knowledge of things,[238] our aims here are to distinguish accurately the notions of simple things from those which are composed of them, and, in addition, to see, in both cases, where falsity may lie, so that we may beware of it, and to see which things can be known with certainty, so that we may get involved in them alone.[239] To these ends, certain things have to be assumed, in this place, as in the considerations above, which perhaps not all are going to accept. But, even if these things are thought to be no more real than the imaginary circles by means of which astronomers describe their phenomena, this matters little, provided that one distinguishes, with their assistance, which kind of knowledge of a given thing can be true or false.[240]

13. We are saying, then, first, that individual things, in the order relating to our knowledge of them, have to be considered otherwise than if we were speaking of them in accordance with how they really exist.[241] For, if we consider some extended and shaped body, for example, then we shall, to be sure, admit that, with respect to the thing, it is something single and simple, because it cannot, in this sense, be said to be a composite of the nature of body, of extension, and of shape, since these parts have never existed separately from each other; none the less, with respect to our intellect, we do call it something composite, something composed of these three natures, because we have first understood each of them separately before we were able to judge that the three of them are found together in one and the same subject.[242] For this reason, we, who are dealing here with things only in so far as they are perceived by the intellect, call 'simple' only those things the knowledge of which is so perspicuous and so distinct that they cannot be divided by the mind into more things known more distinctly.[243] Such are shape, extension, motion, et cetera; all the rest, however, we conceive to be, in a certain sense, composed of these. This is to be taken very generally, so that not even those things are exceptions which we sometimes abstract from the simple things themselves, as happens, when we say that shape is the limit of an extended thing,[244] conceiving something more general by the term 'limit' than by the term 'shape', because it is also possible, namely, to speak of the 'limit' of a duration, of the 'limit' of a motion, et cetera. For then, even if the meaning of the term 'limit' is abstracted from that of 'shape', limit should still not, on that account, be seen as simpler than shape. Rather, since the term 'limit' is also applied to other things – such as to the

[236] This appears to be the task of R. 16.
[237] I.e., that 'part' of the inquiry outlined in § 2 of this rule. The next 'part' is about to begin.
[238] Cf. R. 12, § 2, whose three questions concerning the things to be known are now treated, under eight rubrics, between § 13 and § 26 of this rule.
[239] Cf. R. 8, § 10, for a general anticipation of the details which now follow.
[240] Cf. the strikingly similar remark in the first part of this rule: § 4.
[241] Descartes is fond of the distinction between the *ordo essendi* and the *ordo cognoscendi* – cf., e.g., AT, VII, 8.
[242] Cf. R. 12, § 18, and R. 14, §§ 9–14.
[243] Cf. the definition of 'absolute' in terms of 'simple' in R. 6, § 3.
[244] Cf. Euclid, *The Elements*, bk. I, Definitions no. 13 and no. 14.

rebus tribuatur, ut extremitati durationis vel motus, etc., quae res a figura toto genere differunt, ab his etiam debuit abstrahi, ac proinde est quid compositum ex pluribus naturis plane diversis, et quibus non nisi aequivoce applicatur.

14. Dicimus secundo, res illas, quae respectu intellectus nostri simplices dicuntur, esse vel pure intellectuales, vel pure materiales, vel communes. Pure intellectuales illae sunt, quae per lumen quoddam ingenitum, et absque ullius imaginis corporeae adjumento ab intellectu cognoscuntur: tales enim nonnullas esse certum est, nec ulla fingi potest idea corporea, quae nobis repraesentet, quid sit cognitio, quid dubium, quid ignorantia, item quid sit voluntatis actio, quam volitionem liceat appellare, et similia; quae tamen omnia revera cognoscimus, atque tam facile, ut ad hoc sufficiat, nos rationis esse participes. Pure materiales illae sunt, quae non nisi in corporibus esse cognoscuntur: ut sunt figura, extensio, motus, etc. Denique communes dicendae sunt, quae modo rebus corporeis, modo spiritibus sine discrimine tribuuntur, ut existentia, unitas, duratio, et similia. Huc etiam referendae sunt communes illae notiones, quae sunt veluti vincula quaedam ad alias naturas simplices inter se conjugendas, et quarum evidentia nititur quidquid ratiocinando concludimus. Hae scilicet: quae sunt eadem uni tertio, sunt eadem inter se; item, quae ad idem tertium eodem modo referri non possunt, aliquid etiam inter se habent diversum, etc. Et quidem hae communes possunt vel
[220] ab intellectu puro | cognosci, vel ab eodem imagines rerum materialium intuente.

15. Caeterum, inter has naturas simplices placet etiam numerare earundem privationes et negationes, quatenus a nobis intelliguntur: quia non minus vera cognitio est, per quam intueor,[161] quid sit nihil, vel instans, vel quies, quam illa, per quam intelligo, quid sit existentia, vel duratio, vel motus. Juvabitque hic concipiendi modus, ut deinceps possimus dicere reliqua omnia, quae cognoscemus, ex istis naturis simplicibus esse composita: ut si judicem aliquam figuram non moveri, dicam meam cogitationem esse aliquo modo compositam ex figura et quiete; et sic de caeteris.

16. Dicimus tertio, naturas illas simplices esse omnes per se notas, et nunquam ullam falsitatem continere. Quod facile ostendetur, si distinguamus illam facultatem

[161] A, AT, C, and SGZ: intueor. H: intuear.

extremity of a duration or of a motion, et cetera, which things are totally different in kind from shape –, its meaning must have been abstracted from these too. Hence limit is something composite, something composed of many quite different natures, and the term 'limit' cannot but be applied to them equivocally.

14. We are saying, second, that those things which are said to be 'simple' with respect to our intellect are either purely intellectual, or purely material, or common to both. Purely intellectual are those things which are known by the intellect through a certain innate light and without the aid of any corporeal image.[245] For it is certain that there are some such things, and it is impossible to feign any corporeal idea which could represent for us what knowledge is, what doubt is, what ignorance is;[246] and the same holds for what an act of the will is, which may be called 'volition',[247] and for similar things; yet we really do know all these things, and so easily do we do so, that it suffices, for doing so, that we participate in reason. Purely material are those things which are recognized to be present only in bodies, as are shape, extension, motion, et cetera. Lastly, 'common' are said to be those things which are indiscriminately ascribed, sometimes to corporeal things, sometimes to spirits, such as existence, unity, duration, and the like. To this class one must also refer those common notions which are, as it were, links connecting other simple natures with one another, and on whose evidence is based whatever we conclude by reasoning.[248] For example: 'Things that are the same as a third thing are the same as one another.'[249] And: 'Things that cannot be related in the same way to the same third thing are also different from one another in some respect.' Indeed, these common notions can be known either by the pure intellect or by the intellect's intuiting the images of material things.

15. By the way, it is a good idea to count, among these simple natures, their privations and negations as well, in so far as we understand them, because the knowledge by which I intuit what nothing is, or an instant, or rest, is no less genuine than that by which I understand what existence is, or duration, or motion. This way of conceiving things will, in turn, help us to say that all the remaining things which we know are composed of these simple natures. Thus, if I judge that a certain shape is not moving, then I shall say that my thought is, in some manner, composed of shape and of rest. The same holds for the other cases.

16. We are saying, third, that these simple natures are all known per se and that they never contain any falsity. This we can easily show if we distinguish that faculty by

[245] Cf. R. 6, § 6, as well as §§ 19 and 22 of this rule.

[246] Cf. § 17 of this rule as well as R. 13, § 3.

[247] Cf. *Meditations*, M. III, § 5 (on the definition of 'acts of the will' [*voluntates*]), and M. IV, passim (on the role of the will [*voluntas*] in the commission of error), as well as *Principles*, pt. I, § 32 ff. (on perception [*perceptio*] as the operation of the intellect [*operatio intellectus*] and on volition [*volitio*] as the operation of the will [*operatio voluntatis*] as being the only two modes of thinking [*modi cogitandi*]).

[248] On Descartes' understanding of 'eternal truths' as 'common notions' or logical 'axioms' cf. *Principles*, pt. I, §§ 13 and 49–50. One example represents a version of the principle of non-contradiction (§ 49): 'It is impossible for the same thing to be and not to be at the same time.' Another is connected with the 'ego cogito, ergo sum' (ibid., and §§ 7 and 10): 'He who is thinking cannot but exist while he is thinking.' Cf. also *Discourse*, AT, VI, 32–33; *Meditations*, M. II, §§ 3 and 6, and M. III, §§ 2 and 9; etc.

[249] Cf., once again, Euclid, *The Elements*, bk. I, Common Notion no. 1, and R. 3, § 7.

intellectus, per quam res intuetur et cognoscit, ab ea qua judicat affirmando vel negando; fieri enim potest, ut illa quae revera cognoscimus, putemus nos ignorare, nempe si in illis praeter id ipsum quod intuemur, sive quod attingimus cogitando, aliquid aliud nobis occultum inesse suspicemur, atque haec nostra cogitatio sit falsa. Qua ratione evidens est nos falli, si quando aliquam ex naturis istis simplicibus a nobis totam non cognosci judicemus: nam si de illa vel minimum quid mente attingamus, quod profecto necessarium est, cum de eadem nos aliquid judicare supponatur, ex hoc ipso concludendum est, nos illam totam cognoscere; neque enim aliter simplex dici posset,
[421] sed | composita ex hoc quod in illa percipimus, et ex eo quod judicamus nos ignorare.

17. Dicimus quarto, conjunctionem harum rerum simplicium inter se esse vel necessariam vel contingentem. Necessaria est, cum una in alterius conceptu confusa quadam ratione ita implicatur, ut non possimus alterutram distincte concipere, si ab invicem sejunctas esse judicemus: hoc pacto figura extensioni conjuncta est, motus durationi, sive tempori, etc., quia nec figuram omni extensione carentem, nec motum omni duratione, concipere licet. Ita etiam si dico, 4 et 3 sunt 7, haec compositio necessaria est; neque enim septenarium distincte concipimus, nisi in illo ternarium et quaternarium confusa quadam ratione includamus. Atque eodem modo quidquid circa figuras vel numeros demonstratur, necessario continuum est cum eo, de quo affirmatur. Neque tantum in sensibilibus haec necessitas reperitur, sed etiam, verbi gr., si Socrates dicit se dubitare de omnibus, hinc necessario sequitur: ergo hoc saltem intelligit, quod dubitet;[161] item, ergo cognoscit aliquid esse posse verum vel falsum, etc.: ista enim

[161] H and C: dubitet. A, AT, and SGZ: dubitat.

which the intellect intuits and knows things from that by which it judges by affirming or by denying. For it can happen that we think that we do not know the things that we really do know,[250] namely, if we suspect that there is something else in them hidden from us, something beyond what we intuit or reach in our thinking, even though we are wrong in thinking this. For this reason, it is evident that we are mistaken if we ever judge that we do not completely know any one of these simple natures. For, if our mind attains to even the least thing about it – which is necessary, of course, since the presupposition is that we are making some judgment about it –, then one has to conclude from this that we know it completely. For otherwise it could be called, not 'simple', but 'composite', composed of that which we perceive in it and of that of which we judge ourselves to be ignorant.

17. We are saying, fourth, that the conjunction of these simple things with one another is either necessary or contingent. It is necessary when the one of them is implied in the concept of the other in such a confused sort of manner that, if we judge them to be separate from one another, then we cannot conceive either of them distinctly. In this way, shape is conjoined with extension,[251] and motion is conjoined with duration or with time, et cetera, because one cannot conceive a shape lacking all extension, or a motion lacking all duration. Thus, if I say that 4 and 3 make 7, then the composition is also a necessary one, for we do not distinctly conceive the number 7 unless we include, in a confused sort of way, the number 3 and the number 4 in it. In the same way, whatever is demonstrated concerning figures or concerning numbers is necessarily connected with that of which it is affirmed. This necessity is found, not only in sensible things, but also in others. For example, if Socrates says that he doubts everything,[252] then it necessarily follows from this that he understands at least this, to wit, that he is doubting,[253] and hence that he knows that something can be true or

[250] This *exaggerated* 'Socratic wisdom' is for Descartes the flipside of the kind of ignorance that Socrates is exposing, i.e., that of those who believe that they know what they do not know (cf. *Apology*, 20 e–23 e). Descartes has not yet mentioned Socrates, but he is about to do so – see the next paragraph.

[251] Cf. §§ 13 and 21 of this rule.

[252] Cf. R. 13, § 3. It makes a big difference whether Socrates is saying (1) that he does not believe that he knows what he does not know (cf. *Apology*, 21 d) or (2) that he believes that he does not know anything (ibid.). The Socrates who is interpreted as having meant (2) becomes a paradigmatic individual for the ancient skeptics (cf. Diogenes Laertius, *Collection of Lives and Opinions of the Philosophers*, bk. II, ch. 32). Descartes may have been aware of how the decisive passage was rendered by Montaigne in 'An apology for Raymond Sebond' (*Essais*, bk. II, ch. 12): 'The wisest man who ever was, when asked what he knew, responded that the one thing that he did know was that he knew nothing.' ('Le plus sage homme qui fut onques, quand on lui demanda ce qu'il savait, répondit qu'il savait cela, qu'il ne savait rien.') This choice of translation is intimately connected with the fact that Montaigne strongly sympathizes with the radical skepticism advocated by Pyrrho of Elis (ca. 365–275), the founder of Greek skepticism, and by Sextus Empiricus (fl. ca. A.D. 200), the most distinguished author of Greek skepticism. Yet can the original Greek really bear the strong construction put on it by Montaigne? In any case, this is as close as Descartes comes to mentioning 'skepticism' itself in the *Rules*.

[253] Cf. *Meditations*, M. II, §§ 3, 5, 8–9, and 14: 'Even if I am doubting, then I still must be.' Also, an argument advanced by Descartes in § 3 of this meditation, namely, that, even if he is being deceived, e.g., by the *genius malignus* (cf. M. I, § 12), then he must still be, echoes one made by Augustine – cf. *De civitate Dei*, bk. XI, ch. 26: 'Quid si falleris? Si enim fallor, sum.' Cf. also AT, III, 247 f., as well as Augustine, *De vera religione*, ch. 74. *De libero arbitrio*, bk. II, ch. 20 (or III, 7),

naturae dubitationis necessario annexa sunt. Contingens vero est illorum unio, quae nulla inseparabili relatione conjunguntur: ut cum dicimus, corpus esse animatum, hominem esse vestitum, etc. Atque etiam multa saepe necessario inter se conjuncta sunt, quae inter contingentia numerantur a plerisque, qui illorum relationem non an-
[422] madvertunt, ut haec propositio: sum, ergo Deus est; item, | intelligo, ergo mentem habeo a corpore distinctam, etc. Denique notandum est, plurimarum propositionum, quae necessariae sunt, conversas esse contingentes: ut quamvis ex eo quod sim, certo concludam Deum esse, non tamen ex eo quod Deus sit, me etiam existere licet affirmare.

18. Dicimus quinto, nihil nos unquam intelligere posse praeter istas naturas simplices, et quandam illarum inter se mixturam sive compositionem: et quidem saepe facilius est plures inter se conjunctas simul advertere, quam unicam ab aliis separare: nam, ex. causa, possum cognoscere triangulum, etiamsi nunquam cogitaverim, in illa cognitione contineri etiam cognitionem anguli, lineae, numeri ternarii,[162] figurae, extensionis, etc.; quod tamen non obstat, quominus dicamus trianguli naturam esse compositam ex omnibus istis naturis, atque easdem esse triangulo notiores, cum hae ipsae sint, quae in illo intelliguntur; atque in eodem praeterea aliae fortasse multae involvuntur, quae nos latent, ut magnitudo angulorum, qui sunt aequales duobus rectis, et innumerae relationes, quae sunt inter latera et angulos, vel capacitatem areae, etc.

19. Dicimus sexto, naturas illas, quas compositas appellamus, a nobis cognosci, vel quia experimur quales sint, vel quia nos ipsi componimus. Experimur quidquid sensu percipimus, quidquid ex aliis audimus, et generaliter quaecumque ad intellectum nos-
[423] trum, vel aliunde perveniunt, vel ex sui ipsius contemplatione | reflexa. Ubi notandum

[162] C: numeri ternarii. H: numeri 3^{tij}. A: numeri tertij. AT: numeri ternarij. SGZ: numeri tertii. N: drietal.

false, et cetera.[254] For these matters are necessarily connected with the nature of doubt.[255] Contingent is the union of those things, on the other hand, which are not conjoined by any inseparable relation, as is the case when we say that a body is animate, that a human being is dressed,[256] et cetera. In addition, there are often necessarily conjoined with one another many things which most, who fail to notice the relation between them, count as contingent, as in the case of the proposition: 'I am, therefore God exists.'[257] The same holds for the proposition: 'I understand, therefore I have a mind distinct from the body.'[258] Et cetera. One has to note, finally, that very many propositions which are necessary are contingent when converted. Thus, from the fact that I am, I may conclude with certainty that God also exists, yet, from the fact that God exists, I cannot affirm that I also exist.

18. We are saying, fifth, that we can never understand anything beyond these simple natures and a certain mixture or composition of them with one another. To be sure, it is often easier to notice several mutually conjoined natures at once than to separate the one of them from the others. For I can have knowledge of a triangle, for example, even though the thought has never occurred to me that in this knowledge there is also contained knowledge of the angle, of the line, of the number 3, of shape, of extension, et cetera. None the less, this does not prevent us from saying that the nature of the triangle is composed of all these natures and that they are better known than the triangle, since it is they themselves which are understood in it. Perhaps many other natures, in addition, are involved in the triangle which remain hidden from us, such as the magnitude of the angles, which are equal to two right ones, and the innumerable relations which hold between the sides and the angles, or the size of the area, et cetera.

19. We are saying, sixth, that those natures which we call 'composite' are known by us, either because we learn from experience what sort they are, or because we ourselves compose them. We learn from experience whatever we perceive by means of the senses, whatever we hear from others, and, in general, whatever reaches our intellect, either from elsewhere, or from its reflective contemplation of itself.[259] One has to

De trinitate, bk. XV, ch. 12, sec. 21; *Enchiridion*, bk. VII, ch. 20, etc. This argument is missing in Augustine's early work *Contra Academicos*, but in the much later *On the City of God* it is explicitly directed against 'the Academics', i.e., the philosophers of the 'Second Academy' who followed Arcesilaus of Pitane (ca. 315–240) in adopting Pyrrhonian, radical skepticism.

[254] On the concept of 'hyperbolic doubt(s)' cf. *Meditations*, M. I, passim, and M. VI, § 24.

[255] Cf. Stephen Gaukroger, *Descartes: An Intellectual Biography* (Oxford, 1995), p. 186: '... in the later *Regulae* ... there is simply no evidence of any interest in scepticism in his [Descartes'] writings at this period.' This statement follows a lengthy and detailed treatment of the *Rules* (1619–1620 and 1626–1628). Cf. also Gaukroger, ibid., p. 319: '... sceptical questions are absent from the discussions of cognition in the *Regulae* ...'.

[256] Cf. R. 14, §§ 10–11. [257] Cf. *Meditations*, M. III, passim. [258] Cf. *Meditations*, M. II, §§ 10–16.

[259] 'We learn from experience ...': the Latin infinitive being 'experiri'. This verb generates two substantives, i.e., 'experientia' (usually 'experience') and 'experimentum' (usually 'experiment'). See the index and glossary to the present volume. The *Discours*, of course, would be written in French, and the single expression 'expérience' (variously 'experience', 'experiment', 'observation', etc.) would necessarily become correspondingly ambiguous. Cf. AT, VI, 9–10, 22, 29, 50–51, 63–65, 68, 72–73, and 75–76. It is ironic, indeed, how Descartes, who placed enormous emphasis, not only on the theory of rationality through meditation, but also on the practice of science through experimentation (cf., e.g., *Discourse*, pt. VI, passim), has acquired the one-sided

est, intellectum a nullo unquam experimento decipi posse, si praecise tantum intueatur rem sibi objectam, prout illam habet vel in se ipso vel in phantasmate, neque praeterea judicet imaginationem fideliter referre sensuum objecta, nec sensus veras rerum figuras induere, nec denique res externas tales semper esse quales apparent; in his enim omnibus errori sumus obnoxii: ut si quis fabulam nobis narraverit, et rem gestam esse credamus; si icterico morbo laborans flava omnia esse judicet, quia oculum habet flavo colore tinctum; si denique laesa imaginatione, ut melancholicis accidit, turbata ejus phantasmata res veras repraesentare arbitremur. Sed haec eadem sapientis intellectum non[163] fallent, quoniam, quidquid ab imaginatione accipiet, vere quidem in illa depictum esse judicabit; nunquam tamen asseret, illud idem integrum et absque ulla immutatione a rebus externis ad sensus, et a sensibus ad phantasiam defluxisse, nisi prius hoc ipsum aliqua alia ratione cognoverit. Componimus autem nos ipsi res quas intelligimus, quoties in illis aliquid inesse credimus, quod nullo experimento a mente nostra immediate perceptum est: ut si ictericus sibi persuadeat res visas esse flavas, haec ejus cogitatio erit composita, ex eo quod illi phantasia sua repraesentat, et eo quod assumit de suo, nempe colorem flavum apparere, non ex oculi vitio, sed quia res visae revera sunt flavae. Unde concluditur, nos falli tantum posse, dum res, quas credimus, a nobis ipsis ali-
|424| quo modo componuntur. |

20. Dicimus septimo, hanc compositionem tribus modis fieri posse, nempe per impulsum, per conjecturam, vel per deductionem. Per impulsum sua de rebus judicia componunt illi, qui ad aliquid credendum suo ingenio feruntur, nulla ratione persuasi, sed tantum determinati, vel a potentia aliqua superiori, vel a propria libertate, vel a phantasiae dispositione: prima nunquam fallit, secunda raro, tertia fere semper; sed prima[164] ad hunc locum non pertinet,[165] quia sub artem non cadit.[166] Per conjecturam, ut si ex eo, quod aqua, a centro remotior quam terra, sit etiam tenuioris substantiae, item aër, aqua superior, sit etiam illa rarior, conjicianus supra aërem nihil aliud[167] esse quam aethereum aliquod purissimum,[168] et ipso aëre longe tenuius,[169] etc. Quidquid autem hac ratione componimus, non quidem nos fallit, si tantum probabile esse judicemus atque nunquam verum esse affirmemus, sed etiam doctiores non facit.[170]

[163] A, AT, C, and SGZ: non. Missing in H. Added in L.

[164] A, AT, C, and SGZ: prima. H: n^{a}. L: I^{ma} et 2da. N (clause): Doch het eerste behoort niet tot deze plaats.

[165] A, AT, C, and SGZ: pertinet. H: pertinent. N: behoort.

[166] A, AT, C, and SGZ: cadit. H: cadunt. N: valt.

[167] H, C, and SGZ: aliud. Missing in A and in AT.

[168] SGZ: aethereum aliquod purissimum. H (sic): aetheraliquod purissimum. A and AT: aetherem aliquem purissimum. C: aethereum aliquid purissimum. N: enige zeer zuivere helderheit.

[169] SGZ: tenuius. H and C: tenujus. A and AT: tenuiorem.

[170] H, A, C, and SGZ: non facit. AT: nos facit. N (clause): maar het maakt ons ook niet geleerder. Thus the sense of the clause appears to be: sed etiam doctiores nos non facit.

note here that the intellect can never be deceived by any experience, provided that the intellect intuits precisely only the thing presented to it in the manner in which it possesses the thing, either within itself, or in a phantasm, and provided, in addition, that the intellect does not judge that the imagination faithfully reports the objects of the senses, or that the senses take on the true shapes of things, or, finally, that external things are always such as they appear. For in all these matters we are exposed to error: such as when someone has told us a story and we believe that it is a fact; or such as when someone suffering from the disease of jaundice judges that all things are yellow because his eyes are tinctured with a yellow color; or, finally, such as when we think, due to an impaired imagination, that its disordered phantasms represent real things, as happens to the melancholy. But these things will not deceive the intellect of the wise human being, since, while he will judge that whatever it receives from the imagination is really depicted in the latter, he will still never assert that the same had passed, complete and unaltered, from the external things to the senses, and from the senses to the fantasy, unless he has already known this on some other grounds. Yet we ourselves compose the things that we understand whenever we believe that there is something in them which our mind has not immediately perceived in any experience. Thus, when someone suffering from jaundice is convinced that the things that he sees are yellow, this his thought will be composite, composed of what his fantasy represents to him and of what he assumes on his own, namely, that the color appears yellow, not due to any defect of his eyes, but because the things that he sees really are yellow. And one concludes, from this, that we can only be misled when we ourselves, in some manner, compose the things that we believe.

20. We are saying, seventh, that this composition can occur in three ways, namely, through impulse or through conjecture or through deduction. It is through impulse that those compose their judgments about things who are moved by their natural intelligence to believe something, not persuaded by any reason, but simply determined to do so, either by some superior power, or by their own freedom, or by a disposition of the fantasy. The first type of impulse never deceives, the second, rarely, and the third, almost always; but the first type is also irrelevant in this context, since it does not fall under the rubric of art.[260] Composition through conjecture would be, for example, if, from the fact that water, being further from the center of the globe than earth, is also of a more tenuous substance than it, and, likewise, from the fact that air, being higher than water, is also more rarefied than it, we were then to surmise that above the air there is nothing but some very pure ether, much more tenuous than air itself. While whatever we compose in this manner does not really deceive us – provided only that we judge it to be probable and that we never assert it to be true –, it also does not render us any more learned.[261]

reputation of being a 'rationalist', by which is meant a theoretician who attempts to access truth exclusively, or even primarily and ultimately, by means of reasoning. Hence, too, the jejune reading of Descartes' work as hardly more than a foil to that of Bacon, e.g., et al.

[260] Cf. R. 3, § 9.

[261] Cf. R. 2, §§ 1–2. R. 3, § 3, etc.

21. Superest igitur sola deductio, per quam res ita componere possimus, ut certi simus de illarum veritate; in qua tamen etiam plurimi defectus esse possunt: ut si ex eo, quod in hoc spatio aëre pleno[171] nihil, nec visu, nec tactu, nec ullo alio sensu percipimus, concludamus illud esse inane, male conjungentes naturam vacui cum illa hujus spatii; atque ita fit, quoties ex re particulari vel contingenti aliquid generale et necessa-
[425] rium deduci posse judicamus. Sed hunc erro|rem vitare in nostra potestate situm est, nempe, si nulla unquam inter se conjungamus, nisi unius cum altero conjunctionem omnino necessariam esse intueamur: ut si deducamus, nihil esse posse figuratum, quod non sit extensum, ex eo, quod figura necessariam habet[172] cum extensione connexionem,[173] etc.

22. Ex quibus omnibus colligitur primo, distincte atque, ut opinor, per sufficientem enumerationem nos exposuisse id quod initio confuse tantum et rudi Minerva potueramus ostendere: nempe nullas vias hominibus patere ad cognitionem certam veritatis praeter evidentem intuitum, et necessariam deductionem; item etiam, quid sint naturae illae simplices, de quibus in octava propositione. Atque perspicuum est, intuitum mentis, tum ad illas omnes[174] extendi, tum ad necessarias illarum inter se connexiones agnoscendas,[175] tum demque ad reliqua omnia, quae intellectus praecise, vel in se ipso, vel in phantasia esse experitur. De deductione vero plura dicentur in sequentibus.

23. Colligitur secundo, nullam operam in naturis istis simplicibus cognoscendis esse collocandam, quia per se sunt satis notae; sed tantummodo in illis ab invicem separandis, et singulis seorsim defixa mentis acie intuendis. Nemo enim[176] tam hebeti ingenio est, qui non percipiat se, dum sedet, aliquo modo differre[177] a se ipso, dum stat in
[426] pedes;[178] sed non omnes aeque distincte | separant naturam situs a reliquo eo, quod in illa cogitatione continetur, nec possunt asserere nihil tunc[179] immutari praeter situm. Quod non frustra hic monemus, quia saepe litterati tam ingeniosi esse solent, ut invenerint modum caecutiendi etiam in illis, quae per se evidentia sunt atque a rusticis nunquam ignorantur; quod illis accidit, quotiescumque res istas per se notas per aliquid evidentius tentant exponere: vel enim aliud explicant, vel nihil omnino; nam quis non percipit illud omne quodcumque est, secundum quod immutatur,[180] dum mutamus locum, et quis est qui concipit[18] eandem rem, cum dicitur illi,[182] *locum esse superficiem*

[171] C and SGZ: aëre pleno. H: aere pleno. A: aëris plane. AT: aëris pleno.
[172] H, C, and SGZ: habet. A and AT: habeat.
[173] C and SGZ: connexionem. H: connexcionem. A and AT: conjunctionem.
[174] H, AT, C, and SGZ: omnes. Missing in A. N: alle.
[175] H, C, and SGZ: agnoscendas. A and AT: cognoscendas.
[176] A, AT, C, and SGZ: enim … modo. Missing in H.
[177] H, A, AT, C, and SGZ: differre. L: differt.
[178] H, C, and SGZ: stat in pedes. A and AT: pedibus insistit.
[179] H, AT, C, and SGZ: tunc. A: hinc.
[180] H, A, C, and SGZ: immutatur. L and AT: immutamur. N (clause): Want wie bevat niet dat dit alles, wat het ook is, eenigsins verandert, terwijl wy van plaats veranderen?
[181] H, C, and SGZ: concipit. A and AT: conciperet.
[182] A, H, AT, C, and SGZ: cum dicitur illi. L: quam dicunt illi.

21. There remains, then, deduction alone by which we can compose things in such a way that we may be certain of their truth. Yet even in the case of deduction there can also be many defects,[262] such as when, from the fact that we do not perceive anything in a given space full of air, either by sight or by touch or by any other sense, we conclude that this space is empty, incorrectly conjoining the nature of a vacuum with the nature of this space.[263] This is what happens whenever we judge that we can deduce something general and necessary from something particular or contingent. But it lies within our power to avoid this error, namely, if we never conjoin things with one another unless we intuit that the conjunction of the one with the other is completely necessary, such as when we deduce, from the fact that shape has a necessary connection with extension,[264] that nothing which is not extended can be shaped, et cetera.

22. From all these considerations, one gathers, first, that we have explained distinctly, and, I think, through a sufficient enumeration, what we were able, at the beginning,[265] to show only in a confused and crude way, namely, that there are no paths to a certain knowledge of the truth which are accessible to human beings except for evident intuition and necessary deduction, and, likewise, what those simple natures are which were mentioned in the eighth proposition.[266] It is clear that mental intuition extends both to all these simple natures and to the necessary connections to be recognized between them, as well as, finally, to all the remaining things which the intellect experiences to be exactly either within itself or in the fantasy. But more will be said about deduction in the following remarks.[267]

23. One gathers, second, that one has to expend effort, not in getting to know these simple natures – because they are satisfactorily known per se –, but only in separating them from each other and in intuiting each one separately with a fixed vision of the mind. For no one has such dull natural intelligence that he could not perceive that, when he is sitting, he is, in some manner, different from himself when he is standing. But not all distinguish equally distinctly the nature of position from everything else which this thought contains, nor can all assert that, in this case, nothing changes but the position. Not for nothing are we emphasizing this here, because the learned often tend to be so ingenious that they find ways of blinding themselves even to those things which are self-evident and which every peasant knows.[268] This happens to them whenever they try to explain those things known per se in terms of something more evident. For they explain either something else or nothing at all. For who does not perceive all that, whatever it is, with respect to which change occurs when we change places? And who conceives the same thing when he is told that 'place is the surface of the

[262] Cf. R. 2, § 2, and R. 3, § 5.
[263] Cf. *Meditations*, M. VI, § 15, *Principles*, pt. II, §§ 10, 12, and 16–18 (esp. 16), as well as AT, II, 482, and AT, V, 272.
[264] Cf. §§ 13 and 17 of this rule.
[265] Cf. R. 3, § 4 ff.
[266] I.e., in R. 8 – cf. § 10 thereof.
[267] Cf. § 26 of this rule, which paragraph breaks off, of course, after only a few lines.
[268] On the ignorance of the allegedly learned, a recurring theme in the *Rules*, cf. R. 2, § 1, R. 3, § 1, R. 14, § 8, etc. On the supposedly ignorant but actually prudent peasant cf. also R. 14, § 8. On the figure of the peasant who is wiser than the professor cf., e.g., Cicero, *De officiis*, bk. III, ch. 77.

corporis ambientis? cum superficies ista possit mutari, me immoto et locum non mutante; vel contra mecum ita moveri, ut quamvis eadem me ambiat, non tamen amplius sim in eodem loco. At vero nonne videntur illi verba magica proferre, quae vim habeant[183] occultam et supra captum humani ingenii, qui dicunt *motum*, rem unicuique notissimam, *esse actum entis in potentia, prout in potentia est?* quis enim intelligit haec verba? quis ignorat quid sit motus? et quis non fatetur[184] illos nodum in scirpo quaesivisse? Dicendum est igitur, nullis unquam definitionibus ejusmodi res esse explicandas, ne loco sim-
[427] plicium compositas apprehendamus; sed illas tantum, ab aliis omnibus | secretas, attente ab unoquoque et pro lumine ingenii sui esse intuendas.

24. Colligitur tertio, omnem humanam scientiam in hoc uno consistere, ut distincte videamus, quomodo naturae istae simplices ad compositionem aliarum rerum simul concurrant. Quod perutile est annotare; nam quoties aliqua difficultas examinanda proponitur, fere omnes haerent in limine, incerti quibus cogitationibus mentem debeant praebere, et rati quaerendum esse novum aliquod genus entis sibi prius ignotum: ut si petatur quae[185] sit magnetis natura, illi protinus, quia rem arduam et difficilem esse augurantur, ab iis omnibus quae evidentia sunt animum removentes, eundem ad difficillima quaeque[186] convertunt, et vagi exspectant utrum forte per inane causarum multarum spatium oberrando aliquid novi sint reperturi.[187] Sed qui cogitat, nihil in magnete cognosci posse, quod non constet ex simplicibus quibusdam naturis et per se notis, non incertus quid agendum sit, primo diligenter colligit illa omnia, quae de hoc lapide habere potest, experimenta, ex quibus deinde deducere conatur, qualis necessaria sit naturarum simplicium mixtura ad omnes illos, quos in magnete expertus est, effectus producendos; qua semel inventa, audacter potest asserere, se veram percepisse magnetis naturam, quantum ab homine et ex datis experimentis potuit inveniri.

25. Denique colligitur quarto ex dictis, nullas rerum cognitiones unas aliis obscurio-
[428] res esse putandas, cum | omnes ejusdem sint naturae, et in sola rerum per se notarum

[183] H, AT, C, and SGZ: habeant. A: habent.
[184] H, C, and SGZ: fatetur. A and AT: fateatur.
[185] H, C, and SGZ: quae. A and AT: quid. N: wat.
[186] A, AT, C, and SGZ: quaeque … multarum. Missing in H, which bridges the gap between 'difficillima' and 'multarum' and reads: difficillimarum.
[187] C and SGZ: sint reperturi. A and AT: sit reperturus. H: reperturus.

surrounding body'?[269] For this surface could change, even though I do not move and I do not change places; or, on the other hand, it could move along with me in such a way that, although it still surrounds me, I would no longer be in the same place. But do not those who say that 'motion', something perfectly familiar to everyone, 'is the act of an entity in potency, in so far as it is in potency',[270] seem to be uttering magic words possessing an occult power, a power beyond the grasp of human natural intelligence? For who understands these expressions? Who does not know what motion is?[271] And who does not admit that these people have been trying to find a difficulty where there is none?[272] One has to say, then, that things of this sort are never to be explained by means of definitions, so that we do not apprehend composite things in lieu of simple ones;[273] but rather that only these simple natures, isolated from all others, have to be intuited, attentively by each individual and by means of the light of his natural intelligence.[274]

24. One gathers, third, that all human knowledge consists in this one thing, to wit, that we distinctly see how these simple natures together contribute to the composition of the other things. This is very useful to note, for, whenever some difficulty is proposed for examination, almost all get stuck at the threshold, uncertain on which thoughts they should concentrate their minds, and certain that they have to seek some new kind of entity previously unknown to them.[275] Thus, if one asks what the nature of the magnet is,[276] then, because they augur the thing to be arduous and difficult, they immediately turn their minds away from all the things that are evident, they direct them at all the most difficult matters, and they vaguely expect that, by wandering through the empty space of manifold causes, they are perhaps going to hit upon something new. But someone who thinks that nothing in the magnet can be known which does not consist of certain natures simple and known per se is not uncertain about what is to be done. For, first, he carefully gathers all the observations which he can obtain concerning this stone;[277] then, from them, he tries to deduce what sort of mixture of the simple natures is necessary for producing all the effects which he has found by experience in the magnet;[278] and, finally, once this mixture has been found, he can boldly assert[279] that he has perceived the true nature of the magnet – so far as a human being can find it on the basis of the given observations.

25. Finally, from the things that have been said, one gathers, fourth, that one kind of knowledge of things is not to be regarded as more obscure than another,[280] since all

[269] Cf. Aristotle's definition of 'place': *Physics*, 212 a 5 (bk. IV, ch. 4). Cf. also R. 13, § 5.
[270] Cf. Aristotle, *Physics*, 201 a 10 (bk. III, ch. 1).
[271] But cf. Augustine, *Confessiones*, bk. XI, ch. 14: 'What, then, is "time"? If no one asks me about it, then I know; if I want to explain it to someone who is asking, then I do not know.'
[272] The Latin proverb is 'nodum in scirpo quaerere': 'to look for a knot in a bulrush'. Cf. Plautus, *Menaechmi*, 247.
[273] Cf. Descartes, *Principles*, pt. I, § 10.
[274] On this whole paragraph cf. R. 10, § 3.
[275] Cf. § 6 of this rule as well as R. 14, §§ 1 and 15.
[276] This is the first mention of this question. Cf. R. 13, §§ 1–2 and 11, and R. 14, § 1.
[277] Cf. R. 13, § 1.
[278] Cf. § 18 of this rule as well as R. 14, § 1.
[279] The Latin is: '… audacter potest asserere …'. Cf. R. 7, § 4.
[280] Cf. R. 2, § 1, R. 3, § 1, R. 4, § 1, etc.

compositione consistant. Quod fere nulli advertunt, sed contraria opinione praeventi, confidentiores quidem[188] conjecturas suas tanquam veras demonstrationes asserere sibi permittunt, atque in rebus, quas prorsus ignorant, obscuras saepe veritates quasi per nebulam se videre praesagiunt; quas proponere non verentur, conceptus suos quibusdam verbis alligantes, quorum ope multa disserere et consequenter loqui solent, sed quae revera nec ipsi, nec audientes intelligunt. Modestiores vero a multis examinandis saepe abstinent, quamvis facilibus atque apprime necessariis ad vitam, quia tantum se illis impares putant; cumque eadem ab aliis majori ingenio praeditis percipi posse existiment, illorum sententias amplectuntur, quorum auctoritati magis confidunt.

26. Dicimus octavo,[189] deduci tantum posse, vel res ex verbis, vel causam ab effectu, vel effectum a causa, vel simile ex simili, vel partes sive totum ipsum ex partibus ...[190]

27. Caeterum, ne quem forte lateat praeceptorum nostrorum catenatio, dividimus quidquid cognosci potest in propositiones simplices, et quaestiones. Ad propositiones simplices non alia praecepta tradimus, quam quae vim cognoscendi praeparant ad objecta quaevis distinctius intuenda et sagacius perscrutanda, quoniam hae sponte occur-
[429] rere debent, nec quaeri possunt; | quod in duodecim prioribus praeceptis complexi sumus, ac[191] quibus nos ea omnia exhibuisse existimamus, quae rationis usum aliquomodo faciliorem reddere posse arbitramur. Ex quaestionibus autem aliae intelliguntur perfecte, etiamsi illarum solutio ignoretur, de quibus solis agemus in duodecim regulis proxime sequentibus; aliae denique non perfecte intelliguntur, quas ad duodecim posteriores regulas reservamus. Quam divisionem non sine consilio invenimus,[192]

[188] A, AT, C, and SGZ: quidem. H: quidam.
[189] A and C: octavo. H: [5°]. AT and SGZ: quinto. N: vijfden.
[190] Here there is a lacuna in H and in A. H: Caetera desunt. I also notes the lacuna. A: *Caetera desunt.* N: 't Overige ontbrekt. Between § 26 and § 27 of this rule N inserts, as a separate paragraph, the translation of R. 13, § 6: D'oorzaken worden uit de gewrochten gezocht, als wy van enige zaak onderzoecken of zy, en wat zy is.
[191] H, C, and SGZ: ac. A and AT: et in.
[192] H, A, AT, and SGZ: invenimus. C: invimus. N: ingegaan.

knowledge is of the same nature and consists solely in the composition of things known per se. Almost no one realizes this. Rather, prepossessed by the opposite view, the more confident, to be sure, allow themselves to assert their own conjectures as true demonstrations, and, in matters about which they are completely ignorant, they pronounce that they see, as if through a fog, truths often obscure, which they do not hesitate to propose, tying up their conceptions in certain expressions with whose help they are inclined to explain and to discuss, consistently, many matters which, none the less, neither they themselves nor their listeners really understand. On the other hand, the more modest often refrain from examining many matters, even though easy and extremely necessary for life, simply because they deem themselves unequal to these tasks, and, since they think that these matters can be apprehended by others gifted with greater natural intelligence, they embrace the statements of those whose authority they trust more.

26. We are saying, eighth,[281] that one can deduce only the things from the words, or the cause from the effect, or the effect from the cause, or the like from the like, or the parts or the whole itself from the parts ... .[282]

27. For the rest, so that the linkage[283] of our precepts may not remain hidden to anyone, we are dividing whatever can be known into simple propositions and questions. As for the simple propositions, we do not provide any precepts other than those which prepare the cognitive power to intuit more distinctly[284] and to scrutinize more sagaciously[285] any given objects, because these simple propositions must occur to us spontaneously - we cannot seek them out. We have covered this in the preceding twelve precepts, and we think that, by means of them, we have presented all the things which, we think, can, in some way, facilitate the exercise of reason. As for the questions,[286] however, some are understood perfectly, even though their solutions are unknown, and we shall be dealing exclusively with these questions in the twelve rules immediately following; other questions, finally, are not perfectly understood, and we are reserving the final twelve rules for them. We have deliberately introduced this division,[287] partly so

[281] Here some editors put 'fifth'. But this is obviously the *eighth* point in the series whose first is in § 13 and whose seventh is in § 20 (and § 21) of this rule. Another set of – four – points stretches from § 22 to § 25. The second set simply interrupts the first between the seventh and the eighth points.
[282] Here there is a lacuna in the Latin texts of H and A, but the topic is resumed in R. 13, § 4. Cf. R. 13, § 6.
[283] On the structure and on the content of the *Rules* cf. R. 8, § 10. On the third part in particular cf. R. 13, § 2, and R. 16, § 7.
[284] Cf. R. 9. [285] Cf. R. 10. [286] On what Descartes understands by 'question' cf. R. 13, § 2.
[287] This is the locus classicus for the division of the *Rules* into three books of twelve rules each (cf. R. 8, § 10). Thus Rules 1–12 (Book One) deal with 'simple propositions' and with the two cognitive operations involved in knowing them – here one finds an account of intuition and of deduction. Rules 13–24 (Book Two) treat of 'perfectly understood questions', i.e., problems in which the objects of research represent peculiar functions of the data and which can be expressed in the forms of equations – here one mainly and mostly finds mathematical questions. Rules 25–36 (Book Three) focus on 'imperfectly understood questions', i.e., problems in which the objects of research resist expression in the forms of equations because of the heterogeneity of the data involved – here one mainly and mostly finds empirical-scientific questions. The architectonic argument of the *Rules* is to show how 'imperfectly understood questions' can be 'reduced' to 'perfectly understood questions' (cf. R. 13, § 1). But the project is never accomplished. Simply put, the first part of the work is complete, the second remains a fragment, and the third does not exist at all.

tum ut nulla dicere cogamur, quae sequentium cognitionem praesupponunt, tum ut illa priora doceamus, quibus etiam ad ingenia excolenda prius incumbendum esse sentimus. Notandum est,[193] inter quaestiones quae perfecte intelliguntur, nos illas tantum ponere, in quibus tria distincte percipimus: nempe, quibus signis id quod quaeritur possit agnosci,[194] cum occurret; quid sit praecise, ex quo illud deducere debeamus; et quomodo probandum sit, illa ab invicem ita pendere, ut unum nulla ratione possit mutari, alio immutato. Adeo ut habeamus omnes praemissas, nec aliud supersit docendum, quam quomodo conclusio inveniatur, non quidem ex una re simplici unum quid deducendo, hoc enim sine praeceptis fieri posse jam dictum est, sed unum quid ex multis simul implicatis dependens tam artificiose evolvendo,[195] ut nullibi major ingenii capacitas requiratur, quam ad simplicissimam illationem faciendam. Cujusmodi quaestiones, quia abstractae sunt ut plurimum, et fere tantum in Arithmeticis vel Geo|metricis [430] occurrunt,[196] parum utiles videbuntur imperitis; moneo tamen in hac arte addiscenda diutius versari debere et exerceri illos, qui posteriorem hujus methodi partem, in qua de aliis omnibus tractamus, perfecte cupiant[197] possidere.

[193] H, A, AT, and C: Notandum est. SGZ: Notandumque est.
[194] A, AT, and C: agnosci. H and SGZ: cognosci. N: gekent ... worden.
[195] H, AT, C, and SGZ: evolvendo. A: involvendo.
[196] A, AT, and C: occurrunt. H: occurant. SGZ: occurrant.
[197] AT, C, and SGZ: cupiant. H: cupiat. A: cupiunt. N: begeren.

that we would not be forced to say things which presuppose knowledge of things which follow, and partly so that we might set forth first those matters in which, we feel, one also has to get involved first in order to cultivate the natural intelligence. One has to note that among the questions which are perfectly understood we place only those in the case of which we have distinctly perceived three things,[288] namely, by means of which signs we might recognize what we are seeking when it occurs to us, what exactly it is from which we should deduce it, and how we are to prove that the two are so mutually dependent that the one cannot change in any respect without the other's being changed too. Thus we would possess all the premisses, and nothing would remain to be shown other than how the conclusion is to be found — of course, not by deducing a single thing from a single, simple thing, for it has already been said that this can be done without precepts,[289] but rather by developing a single thing dependent on many mutually implicated things, and by doing this in such an artful manner that nowhere is a greater capacity of the natural intelligence required than for making the simplest inference.[290] Because questions of this sort are, for the most part, abstract, and they occur almost exclusively in arithmetic or in geometry, they will seem to the inexperienced to be of little use. However, I am warning those who desire a perfect possession of the latter part of this method, in which we deal with all the other questions, that they should study and practice this art for a long time in order to acquire it.

[288] On the first two of the three cf. R. 13, § 8 ff.
[289] Cf. R. 2, § 4, R. 3, § 5, and R. 4, § 2.
[290] Cf. R. 6, § 7, R. 11, § 5, and R. 17, passim.

LIBER II

DE QUAESTIONIBUS PERFECTE INTELLECTIS

Regula XIII

De resolutione directa quaestionum

Si quaestionem perfecte intelligamus, illa est ab omni superfluo conceptu abstrahenda, ad simplicissimam revocanda, et in quam minimas partes cum enumeratione dividenda.

1. Atque in hoc uno Dialecticos imitamur, quod, sicut illi ad syllogismorum formas tradendas, eorundem terminos, sive materiam cognitam esse supponunt, ita etiam nos hic praerequirimus, quaestionem esse perfecte intellectam. Non autem, ut illi, duo extrema distinguimus et medium; sed hoc pacto rem totam consideramus: primo, in omni quaestione necesse est aliquid esse ignotum, aliter enim frustra quaereretur; secundo, illud idem debet aliquomodo esse designatum, aliter enim non essemus determinati ad illud potius quam ad[198] aliud quidlibet inveniendum; tertio, non potest ita[199] designari, nisi per aliud quid quod sit cognitum. Quae omnia reperiuntur etiam in quaestionibus
[431] imperfectis: ut si quaeratur, qualis sit magnetis natura, id quod | intelligimus significari per haec duo vocabula, magnes et natura, est cognitum, a quo determinamur ad hoc potius quam ad[200] aliud quaerendum, etc. Sed insuper ut quaestio sit perfecta, volumus illam omnimode[201] determinari, adeo ut nihil amplius quaeratur, quam id quod[202] deduci potest ex datis: ut si petat aliquis a me, quid de natura magnetis sit inferendum praecise ex illis experimentis, quae Gilbertus se fecisse asserit, sive vera sint, sive falsa;

[198] A, AT, and C: ad. Missing in H and in SGZ.
[199] A, AT, C, and SGZ: ita. Missing in H.
[200] A, AT, and C: ad. Missing in H and in SGZ.
[201] H, C, and SGZ: omnimode. A and AT: omnino. N: gantschelijk.
[202] A, AT, C, and SGZ: quod. Missing in H.

BOOK TWO

ON PERFECTLY UNDERSTOOD QUESTIONS

Rule Thirteen

On the Direct Resolution of Questions

If we would perfectly understand a question, then it has to be abstracted from every superfluous conception, reduced to its simplest form, and divided up into the smallest possible parts together with an enumeration.[291]

1. In this one thing we do imitate the dialecticians:[292] as, in order to expound the forms of the syllogisms,[293] they presuppose that the terms or the matter of the syllogisms are known, so we are also making it a prerequisite here that the question has been perfectly understood. Yet we do not distinguish, as they do, two extreme terms and a middle term,[294] but rather do we view the whole matter in the following way: First, it is necessary, in every question, that there be something unknown, for otherwise there would be no point in posing the question. Second, this unknown something must be designated in some way, for otherwise we would not be determined to find this out rather than anything else at all. Third, the something which is unknown cannot be thus designated except by way of something else, which is known. All these things are also found in the case of imperfect questions. Thus, if one inquires as to what the nature of the magnet is,[295] then what we understand the two words 'magnet' and 'nature' to signify is known, and this knowledge determines us to inquire into this rather than into something else, et cetera. But, above and beyond this, in order that the question may be perfect, we want it to be determinate in every respect,[296] so much so, that nothing more is being sought than what can be deduced from the data. For example, someone asks me what is to be inferred about the nature of the magnet precisely from the experiments which Gilbert[297] asserts that he has performed, whether they are true or false.[298]

[291] Cf. the sketch of Rs. 13–16 outlined in R. 12, §§ 10–11.
[292] Cf. R. 2, § 4, R. 4, § 2, and R. 10, §§ 4–5. [293] Cf. R. 2, § 3, R. 7, § 5, R. 10, § 5, and R. 14, § 2.
[294] In a categorical syllogism, the middle term is that term which occurs in both premisses, but not in the conclusion, whereas the extreme terms are the minor term and the major term, each of which occurs only in the minor premiss and in the major premiss, respectively, but both of which are connected in the conclusion. E.g.: All human beings are mortal. (This is the major premiss containing the middle term 'human beings' and the major term 'mortal'.) But all philosophers are human beings. (This is the minor premiss containing the minor term 'philosophers' and the middle term 'human beings'.) Therefore all philosophers are mortal. (This is the conclusion containing the minor term 'philosophers' as its subject and the major term 'mortal' as its predicate, but not containing the middle term 'human beings'.)
[295] Cf. R. 12, § 24. [296] Cf. R. 14, § 6.
[297] William Gilbert (1544–1603) is the English physicist and physician best known for his research on electricity (he coined the word for it) and magnetism (he was the first to distinguish between electric and magnetic phenomena). He is the author of the pathfinding work *De Magnete* (1600), whose full title is: *The New Physics of the Magnet and of Magnetic Bodies as well as of the Great Magnet, the Earth.*
[298] Cf. R. 12, § 24.

item, si petat, quid de natura soni judicem praecise tantum ex eo, quod tres nervi A, B, C, aequalem edant sonum, inter quos ex suppositione B duplo crassior est quam A, sed non[203] longior, et tenditur a pondere duplo graviori; C vero non quidem crassior est quam A, sed duplo longior tantum, et tenditur tamen a pondere quadruplo graviori, etc. Ex quibus facile percipitur, quomodo omnes quaestiones imperfectae ad perfectas[204] reduci possint, ut fusius exponetur suo loco; et apparet etiam, quomodo haec regula possit observari, ad difficultatem bene intellectam ab omni superfluo conceptu abstrahendam, eoque reducendam, ut non amplius cogitemus nos circa hoc vel illud subjectum versari, sed tantum in genere circa magnitudines quasdam inter se comparandas;[205] nam, verbi gratia, postquam determinati sumus ad haec vel illa tantum de magnete experimenta spectanda, nulla superest difficultas in cogitatione nostra ab
[432] omnibus aliis removenda. |

2. Additur praeterea, difficultatem esse ad simplicissimam reducendam, nempe juxta regulas quintam et sextam, et dividendam juxta septimam: ut si magnetem examinem ex pluribus experimentis, unum post aliud[206] separatim percurram; item si sonum, ut dictum est, separatim inter se comparabo nervos A et B, deinde A et C, etc., ut postea omnia simul sufficienti enumeratione complectar. Atque haec tria tantum occurrunt circa alicujus propositionis terminos servanda ab intellectu puro, antequam ejus ultimam solutionem aggrediamur, si sequentium undecim regularum usu indigeat; quae quomodo facienda sint, ex tertia parte hujus tractatus clarius patebit. Intelligimus autem per quaestiones, illa omnia in quibus reperitur verum vel falsum; quarum diversa genera enumeranda sunt ad determinandum, quid circa unamquamque praestare valeamus.

3. Jamjam diximus, in solo intuitu rerum, sive simplicium, sive copulatarum, falsitatem esse non posse; neque etiam hoc sensu quaestiones appellantur, sed nomen istud[207] acquirunt, statim atque de iisdem judicium aliquod determinatum ferre deliberamus. Neque enim illas petitiones tantum, quae ab aliis fiunt, inter quaestiones numeramus; sed de ipsa etiam ignorantia, sive[208] potius dubitatione Socratis quaestio fuit, cum primum ad illam conversus Socrates coepit inquirere, an verum esset se de omnibus dubi-
[433] tare, atque hoc ipsum asseruit.

[203] A, AT, C, and SGZ: non … sed. Missing in H. L notes, but does not fill, the lacuna.
[204] A, AT, C, and SGZ: ad perfectas. Missing in H. N (clause): hoc men alle onvolmaakte vraagstucken tot volmaakte kan brengen.
[205] H, C, and SGZ: comparandas. A and AT: componendas. N: te vergelijken.
[206] A, AT, C, and SGZ: aliud. H: aliquid ut.
[207] H, C, and SGZ: istud. A and AT: illud.
[208] A, AT, C, and SGZ: sive. H: si. L: seu.

Or someone asks me what judgments I would make about the nature of sound,[203] precisely and solely from the fact that three strings, A, B, and C, emit the same sound, on the presuppositions that, of the three strings, B is twice as thick as A, but no longer, and that it is tensioned by a weight twice as heavy, as well as that C is, to be sure, no thicker than A, but just twice as long, and that it is tensioned, none the less, by a weight four times as heavy, et cetera. One easily perceives, from these examples, how all imperfect questions can be reduced to perfect ones - as will be explained at greater length in the appropriate place.[204] It is also apparent how one might observe this rule in order to abstract a difficulty which is well understood from every superfluous conception, and in order to reduce it to the point where we no longer think that we are dealing with this or that subject, but rather only with certain magnitudes in general, magnitudes to be compared with one another.[205] For, after we have decided to consider only these or those experiments relating to the magnet, for example, there remains no difficulty in distancing our thought from everything else.

2. We add, furthermore, that the difficulty has to be reduced to the simplest form, namely, according to the fifth and the sixth rules, and that it has to be divided up, according to the seventh rule.[206] Thus, if I examine the magnet on the basis of many observations, then I shall run through them separately and successively. Once again, if I examine sound, as has been said above, then I shall separately compare with one another strings A and B, A and C, et cetera, in order that I might encompass all of them together by means of a sufficient enumeration. With respect to the terms of a given proposition, these three things alone have to be observed by the pure intellect before we embark on the final solution of that proposition, though the solution may require the employment of the following eleven rules.[207] How these things have to be done will become clearer from the third part of the treatise.[208] By 'questions', however, we understand all the things in which the true or the false is found. We have to enumerate the different kinds of questions in order to determine what we have the power to achieve concerning each question.

3. We have already said[209] that there can be no falsity in the mere intuition of things, whether they are simple or copulate, and, in this sense, they are also not called 'questions', but rather do they acquire that name as soon as we decide to make some determinate judgment about them. Yet we do not count as questions only those queries which are made by others. For there was also Socrates' question about his own ignorance, or, more accurately, about his own doubt:[210] Once he had first become aware of his doubt, Socrates began to inquire as to whether it was true that he was in doubt about all things, and he asserted that it was.

[203] Cf. AT, X, 337, 431, and 488.
[204] This is not achieved in the extant *Rules*. Cf. R. 14, §§ 1–6, and R. 16, § 7.
[205] Cf. R. 14, §§ 2–4.
[206] These three references seem to be of a general nature.
[207] I.e., Rs. 14–24.
[208] The third part of the treatise, i.e., Rules 25–36, is, of course, missing.
[209] Cf. R. 6, § 6, and R. 12, §§ 16, 19, 25, and 27.
[210] Cf. R. 12, § 17 (and § 14 on 'doubt').

4. Quaerimus autem vel res ex verbis, vel ex effectibus causas, vel ex causis effectus, vel ex partibus totum, sive alias partes, vel denique plura simul ex istis.

5. Res ex verbis quaeri dicimus, quoties difficultas in orationis obscuritate consistit; atque huc referuntur non solum omnia aenigmata, quale fuit illud Sphingis de animali, quod initio est quadrupes, deinde bipes, et tandem postea fit tripes; item, illud piscatorum, qui, stantes in littore, hamis et arundinibus ad pisces capiendos instructi, ajebant, se non habere amplius illos quos ceperant, sed vice versa se habere illos quos nondum capere potuerant, etc.; sed praeterea in maxima parte eorum, de quibus litterati disputant, fere semper de nomine quaestio est. Neque oportet de majoribus ingeniis tam male sentire, ut arbitremur illos res ipsas male concipere, quoties easdem non satis aptis verbis explicant: si quando, ex. gr., superficiem corporis ambientis vocant locum, nullam rem falsam revera concipiunt, sed tantum nomine loci abutuntur, quod ex usu communi significat illam[209] naturam simplicem et per se notam, ratione cujus aliquid dicitur hic esse vel ibi; quae tota in quadam relatione rei, quae dicitur esse in loco, ad partes spatii extensi,[210] consistit, et quam nonnulli, videntes nomen loci a superficie
[434] ambiente esse occupatum, ubi intrinsecum improprie dixerunt, et sic | de caeteris. Atque hae quaestiones de nomine tam frequenter occurrunt ut, si de verborum siginificatione inter Philosophos semper conveniret, fere omnes illorum controversiae tollerentur.

6. Ex effectibus causae quaeruntur, quoties de aliqua re, utrum sit, vel quid sit, investigamus ...[211]

7. Caeterum quia, dum aliqua quaestio nobis solvenda proponitur, saepe non statim advertimus, cujus illa generis existat, nec utrum res ex verbis, vel causae[212] ab effectibus etc., quaerantur: idcirco de his in particulari dicere plura, supervacaneum mihi videtur. Brevius enim erit et commodius, si simul omnia, quae facienda sunt ad cujuslibet

[209] A, AT, C, and SGZ: illam ... esse. Missing in H. L notes, but does not fill, the lacuna.
[210] H, A, and SGZ: extensi. AT: exterioris. C: externi. N (phrase): der uitgestrekte ruimte.
[211] Here there is a lacuna in H and in A. H: M. reliqua desunt. L also notes the lacuna. A: *Reliqua desunt*. N does not put the translation of this paragraph here, but rather between § 26 and § 27 of R. 12.
[212] AT, C, and SGZ: causae. H and A: causa.

4. But we are seeking either things from words, or causes from effects, or effects from causes, or a whole from the parts, or some parts from other parts, or, finally, several of these together from others.[307]

5. We say that things are being sought from words whenever the difficulty consists in the obscurity of the language employed. Here belong not only all riddles, such as that of the Sphinx about the animal which is four-footed at first, yet which then becomes two-footed, and, later on, finally, three-footed;[308] or the one about the anglers who, standing on the shore and equipped with rods and with lines for catching fish, maintain that they no longer have the ones which they have caught, but, on the contrary, that they do have those which they have not yet been able to catch, et cetera;[309] but also, in the greatest part of the things about which the learned dispute, the question is almost always about words.[310] Yet we should not have such a poor opinion of those of greater natural intelligence that we would think that they poorly conceive the things themselves whenever they do not explain them by means of appropriate enough terms.[311] For example, when they call 'place' 'the surface of the surrounding body',[312] they are not really conceiving anything false, but merely misusing the word 'place', which signifies, in its common usage, the nature, simple and known per se, by reason of which something is said to be here or there. This nature consists entirely in a certain relation between the thing, which is said to be in the place, and the parts of extended space. Some, seeing that the term 'place' has been reserved for the surrounding surface, have improperly called this nature 'the intrinsic where'.[313] And the same holds for the other cases. These questions about words occur so frequently that, if there were always agreement among philosophers about the meanings of words, then almost all their controversies would be eliminated.[314]

6. Causes are being sought from effects whenever we are investigating, concerning something, whether it is, or what it is ... .[315]

7. By the way, when a question is proposed for us to solve, we often do not immediately notice of what sort it is, nor whether things are being sought from words, or causes from effects, et cetera. Hence it seems to me useless to say more in particular about these matters. It will be more timely and more convenient if we follow through,

[307] Cf. R. 12, § 26, as well as § 6 of this rule.
[308] Cf. § 10 of this rule.
[309] Cf. § 10 of this rule.
[310] Cf. R. 14, §§ 8–14, esp. 8–9.
[311] It may well be that this is another of the loci classici for the formulation of the phenomenological motto. On the other hand, this spot also shows that what is at stake is the crucial turn: 'From the mere words to the things themselves.' Cf. Husserl, *Logische Untersuchungen*, vol. II, pt. 1, *Untersuchungen zur Phänomenologie und Theorie der Erkenntnis*, p. 10, ll. 5–14: 'Von den bloßen Worten auf die Sachen selbst.' Arguably, Heidegger's *Sein und Zeit* (1927) has been responsible for the one-sided version of the motto (§ 7): 'Zu den Sachen selbst!' Cf. also R. 8, §§ 8 and 10, and R. 12, §§ 2 and 11.
[312] Cf. R. 12, § 23.
[313] In Scholastic physics, 'the intrinsic where' – the Latin 'ubi intrinsecum' sounds about as strange – is the space which a body occupies. Cf. Descartes, *Principles*, pt. II, §§ 10–15.
[314] Cf. R. 3, § 6.
[315] Cf. § 4 of this rule as well as R. 12, § 26. Here there is a lacuna in the Latin texts of H and A. The lost material is perhaps partially reproduced in the second edition of Antoine Arnauld's and Pierre Nicole's *La logique ou l'art de penser* (1664), an extract from which is provided in the appendix following the *Rules*.

difficultatis solutionem, ordine persequamur; ac proinde, qualibet data quaestione, imprimis enitendum est, ut distincte intelligamus, quid quaeratur.

8. Frequenter enim nonnulli in propositionibus investigandis ita festinant, ut ad illarum solutionem vagum ingenium applicent, antequam animadverterint, quibusnam signis rem quaesitam, si forte occurrerit, internoscent: non minus inepti quam puer aliquo missus a domino, qui tam cupidus esset obsequendi, ut currere festinaret nondum mandatis acceptis, nec sciens quonam ire juberetur.

9. At vero in omni quaestione, quamvis aliquid debeat esse incognitum, alioqui
[435] enim frustra quaereretur, oportet tamen hoc ipsum certis conditionibus ita esse | designatum, ut omnino simus determinati ad unum quid potius quam ad[213] aliud investigandum. Atque hae sunt conditiones, quibus examinandis statim ab initio dicimus esse incumbendum: quod fiet, si ad singulas distincte intuendas mentis aciem convertamus, inquirentes diligenter quantum ab unaquaque illud ignotum quod quaerimus sit limitatum; dupliciter enim hic solent falli humana ingenia, vel scilicet aliquid amplius quam datum sit assumendo ad determinandam quaestionem, vel contra aliquid omittendo.

10. Cavendum est, ne plura et strictiora, quam data sint, supponamus: praecipue in aenigmatis aliisque petitionibus artificiose inventis ad ingenia circumvenienda, sed interdum etiam in aliis quaestionibus, quando ad illas solvendas aliquid quasi certum supponi videtur, quod nulla nobis certa ratio, sed inveterata opinio persuasit. Ex. causa, in aenigmate Sphingis, non putandum[214] est, pedis nomen veros tantum animalium pedes significare, sed videndum etiam, utrum ad alia quaedam possit transferri, ut contingit, nempe ad manus infantis, et ad scipionem senum, quia utrique his utuntur quasi pedibus ad incedendum. Item, in illo piscatorum cavendum est, ne cogitatio piscium ita mentem nostram occupaverit, ut illam avertat a cognitione illorum animalium, quae saepe pauperes secum inviti circumferunt, et capta rejiciunt. Item, si quaeratur, quo-
[436] modo constructum fuerit vas, quale vidimus | aliquando, in cujus medio[215] stabat columna, cui imposita erat Tantali effigies quasi bibere gestientis; in hoc autem vase

[213] A, AT, and C: ad. Missing in H and in SGZ.
[214] A, AT, C, and SGZ: putandum. H: pudantum. L: statuendum.
[215] A, AT, C, and SGZ: medio. Missing in H. Added in L.

in order, all the things in general which have to be done for the solution of any difficulty whatever. Therefore, whatever question has been raised, we must strive, above all, to understand distinctly what is being sought.

8. For some are frequently in such a hurry to investigate propositions that they apply vague natural intelligence to their solution – before they have noticed by means of which signs they will recognize the thing sought if it should perhaps occur to them.[316] They are no less inept than a servant who, having been sent by the master, is so eager to obey that he is in a hurry to run off – yet without having received instructions and without knowing where he was ordered to go.

9. To be sure, there must be, in every question, something unknown, for otherwise there would be no point in posing the question; none the less, this unknown something must be so delineated by certain conditions that we are completely determined to investigate one thing rather than another. We are saying that these are conditions in whose examination we have to get involved right from the start. This will happen if we concentrate the vision of the mind on intuiting each individual condition distinctly, carefully inquiring as to what extent the unknown something which we are seeking is delimited by each and every condition. For human natural intelligence tends to err here in two ways, namely, either by assuming something more to determine the question than is given, or – on the other hand – by leaving something out.[317]

10. We have to be careful not to suppose more and stricter data than are given. This holds especially in the case of riddles and of other queries artificially invented in order to outwit natural intelligence.[318] But sometimes it also holds in the case of other questions, such as when, in order to solve them, we seem to presuppose something as if it were certain, not because some certain reason, but because an out-dated opinion, convinces us of it. For example, in the riddle of the Sphinx,[319] one must not think that the word 'foot' signifies exclusively the real feet of animals. Rather, one also has to see whether it can be transferred to other things, as happens here, namely, to an infant's hands and to an old man's walking-stick, because these are both used as feet, as it were, for getting around. Likewise, in the riddle of the anglers,[320] one has to be careful not to let the thought of fish so preoccupy our mind that it distracts us from the knowledge of those animals which the poor often unwillingly carry around with them and which they throw away when caught. Something similar holds, once again, if one inquires as to how a vessel was constructed, such as the one which we once saw, in whose center there was a column, on top of which was imposed a figure of Tantalus[321] looking as if he were longing to drink. Now the water which had been poured into the vessel was,

[316] Cf. R. 12, § 27.
[317] Cf. a similar train of thought about overdetermination and underdetermination of paths of inquiry in R. 4, § 2.
[318] Contemporary examples might include 'the Monty Hall problem of the three doors', 'the prisoners' dilemma', 'the paradox of (the) three prisoners', etc.
[319] Cf. § 5 of this rule.
[320] Cf. § 5 of this rule.
[321] Tantalus, son of Zeus, is a figure of Greek mythology. For a variety of reasons, he fell into disfavor with the gods and as punishment was condemned to hang from the bough of a fruit tree over a pool of water. Whenever he bent to drink, the water would recede; whenever he reached for fruit, the wind would blow it from his reach. Hence the English word 'tantalizing'.

aqua quidem infusa optime continebatur, quamdiu non erat satis alta ut os Tantali ingrederetur; sed statim atque ad infelicia labra pervenerat, tota protinus effluebat: videtur quidem prima fronte totum artificium fuisse in hac Tantali effigie construenda, quae tamen revera nullo modo determinat quaestionem, sed illam tantum comitatur: tota enim difficultas in hoc uno consistit, ut quaeramus quomodo vas sit ita construendum, ut aqua ex eo tota effluat, statim atque ad certam altitudinem pervenerit, prius autem nullo modo. Item denique, si ex iis omnibus, quas circa astra habemus, observationibus[216] quaeratur,[217] quid de illorum motibus possimus certi asserere, non gratis assumendum est, terram esse immobilem atque in rerum medio constitutam, ut fecere Antiqui, quia nobis ab infantia ita visum est; sed hoc ipsum etiam in dubium revocari debet, ut examinemus postea, quid certi de hac re liceat judicare. Et sic de caeteris.

11. Omissione vero peccamus, quoties aliqua conditio ad quaestionis determinationem requisita, in eadem vel expressa est, vel aliquo modo intelligenda, ad quam non reflectimus: ut si quaeratur motus perpetuus, non naturalis, qualis est astrorum vel fontium, sed ab humana industria factus, et aliquis,[218] sicut nonnulli fieri posse crediderunt,
[437] existimantes terram perpetuo mo|veri circulariter circa suum axem, magnetem vero omnes terrae proprietates, retinere, putet[219] se motum perpetuum inventurum,[220] si hunc lapidem ita aptaverit,[221] ut in orbem moveatur, vel certe ferro suum motum cum aliis suis virtutibus communicet; quod etsi contingeret, non tamen motum perpetuum arte faceret,[222] sed illo tantum qui naturalis est utere[n]tur,[223] non aliter quam si ad fluminis lapsum rotam ita applicaret,[224] ut semper moveretur; omitteret[225] igitur ille[226] conditionem ad quaestionis determinationem requisitam, etc.

12. Quaestione sufficienter intellecta, videndum est praecise, in quo difficultas ejus consistat, ut haec ab aliis omnibus abstracta facilius solvatur.

[216] A, AT, and C: habemus, observationibus. H and SGZ: habemus observationes.
[217] H, C, and SGZ: quaeratur. A and AT: quaeritur.
[218] H, AT, C, and SGZ: et aliquis. Missing in A.
[219] AT, C, and SGZ: putet. H and A: putantes. N (phrase): en achten dat zy.
[220] H, AT, C, and SGZ: inventurum. A: inventuros. N: zy ... zullen vinden.
[221] H, AT, C, and SGZ: aptaverit. A: aptaverint. N: zy ... konden maken.
[222] H, AT, C, and SGZ: faceret. A: facerent. N: zou hy ... maken.
[223] C: utere[n]tur. H: uterentur. L: uteretur. A: uterentur. AT and SGZ: uteretur. N: zou hy ... gebruiken.
[224] H, AT, C, and SGZ: applicaret. A: applicarent. N: hy ... zette.
[225] H, AT, C, and SGZ: omitteret. A: omitterent. N: Hy zou ... nalaten.
[226] H, AT, C, and SGZ: ille. A: illi. N: Hy.

indeed, retained well within it, so long as it was not high enough that it would flow into Tantalus' mouth; as soon as the water reached the unfortunate man's lips, however, it all flowed out. To be sure, it seems, at first glance, that the artifice here lay entirely in the construction of the figure of Tantalus; none the less, this figure does not really determine the question in any way, but rather does it merely accompany it. For the whole difficulty consists in this one thing, to wit, that we inquire as to how the vessel has to be constructed in such a way that all the water flows out of it as soon as it has reached a certain level, but not before. In the same way, once again and finally, if we inquire as to what we might assert with certainty about the motions of the stars from all the observations which we have concerning them, then we must not gratuitously assume, as the ancients did, that the earth is motionless and fixed at the center of things, just because it has appeared to us, from our infancy, to be thus. Rather, this very thing should also be called into doubt, in order that we may then examine what judgments we can make with certainty about this matter.[322] The same holds for the other cases.

11. We are sinning by omission, on the other hand, whenever we do not reflect on some condition required for the determination of a question, a condition which is either expressed in it or to be understood in some way. For example, someone is seeking perpetual motion – not natural perpetual motion, such as that of the stars and of the springs, but the perpetual motion made by human industry – and he believes – as some have been able to do, thinking that the earth perpetually moves circularly around its own axis, while the magnet has all the properties of the earth – that he would then find perpetual motion if he could set up this stone in such a way that it would move in a circle, or, at least, in such a way that it would transmit its motion, along with its other powers, to a piece of iron.[323] Yet, even if this did happen, he would still not be producing perpetual motion by means of art. Rather, he would simply be using a motion which is natural, not otherwise than if he placed a wheel in the fall of a river in such a way that the wheel always moved.[324] He would be omitting, therefore, a condition required for the determination of the question.

12. Once the question has been sufficiently understood, one has to see precisely wherein its difficulty consists, in order that, after it has been abstracted from all other matters, the question may be more easily solved.

[322] One of the signs of the times is the struggle between the geocentric worldview of Ptolemy of Alexandria (ca. 90–168) and the heliocentric worldview of Nicolaus Copernicus (1473–1543). After the *Rules* Descartes would observe the fate of Galileo Galilei (1564–1642), who would support Copernicanism (cf., e.g., *Dialogo sopra i due massimi sistemi del mondo, tolemaico e copernicano* [1632]), at the hands of the Inquisition of the Roman Catholic Church, which would condemn it (1633). Thus Descartes would refrain from publishing *Le Monde ou le Traité de la lumière* (1633) because doing so would have revealed that he did believe that the earth moves. Cf. AT, I, 270–272, and *Discourse*, pt. V, passim, and pt. VI, § 1.
[323] This may be an allusion to some of Gilbert's work on magnetism – cf. R. 13, § 1. *De Magnete* does contain descriptions of methods for strengthening natural magnets (lodestones) and for producing artificial ones, an account of the behavior of the earth as that of a giant magnet with its poles near the geographical ones, and an explanation of how an iron bar left aligned with the earth's magnetic field becomes magnetized. But the point of Descartes' remarks here is not necessarily a criticism of Gilbert.
[324] Cf. R. 5, § 1.

13. Non semper sufficit quaestionem intelligere, ad cognoscendum in quo sita sit ejus difficultas; sed insuper reflectendum est ad singula quae in illa requiruntur, ut si quae occurrant nobis inventu facilia, illa omittamus, et illis ex propositione sublatis, illud tantum remaneat quod ignoramus. Ut in illa quaestione de vase paulo ante descripto, facile quidem advertimus,[227] quomodo vas faciendum sit: columna in ejus medio statuenda, avis pingenda, etc.: quibus omnibus rejectis, ut ad rem non facienti-
[438] bus, superest nuda difficultas in eo, quod aqua prius in vase contenta, postquam ad | certam altitudinem pervenit, tota effluat: quod unde accidat, est quaerendum.

14. Hic igitur tantum operae pretium esse dicimus, illa omnia, quae in propositione data sunt, ordine perlustrare, rejiciendo illa, quae ad rem non facere aperte videbimus, necessaria retinendo, et dubia ad diligentius examen remittendo.

Regula XIV

De repraesentatione et imaginatione

Eadem est ad extensionem realem corporum transferenda, et tota per nudas figuras imaginationi proponenda: ita enim longe distinctius ab intellectu percipietur.

1. Ut autem etiam imaginationis utamur adjumento, notandum est, quoties unum quid ignotum ex aliquo alio jam ante cognito deducitur, non idcirco novum aliquod genus entis inveniri, sed tantum extendi totam hanc cognitionem ad hoc, ut percipiamus rem quaesitam participare hoc vel illo modo naturam eorum quae in propositione data sunt. Exempli causa, si quis a nativitate caecus sit, non sperandum est ullis unquam argumentis nos effecturos, ut veras percipiat colorum ideas, quales nos habemus a sensibus haustas; sed si quis primarios colores viderit quidem aliquando, intermedios autem et mixtos nunquam, fieri potest ut illorum etiam, quos[228] non vidit, imagines ex aliorum similitu-
[439] dine per | deductionem quandam effingat.[229] Eodem modo, si in magnete aliquod sit genus entis, cui nullum simile intellectus noster hactenus perceperit, non sperandum est nos illud unquam ratiocinando cognituros; sed vel novo aliquo sensu instructos esse oporteret, vel mente divina; quidquid autem hac in re ab humano ingenio praestari

[227] H, C, and SGZ: advertimus. A and AT: animadvertimus.
[228] A, AT, C, and SGZ: quos. H: quas.
[229] To this sentence H contains the following marginal note, which is missing in A: non absolute verum est hoc exemplum, sed melius non habui ad explicandum id quod verum est. N: Dit voorbeelt is niet volstrektelijk waar: maar ik had geen beter om 't geen, dat waar is, te verklaren.

13. In order to recognize wherein a question's difficulty lies, it does not always suffice to understand the question, but rather do we also have to reflect on the particulars which are required in it, in order that, if any should occur to us which are easy to discover, then we may omit them, and in order that, these having been eliminated from the proposition, only that may remain which we do not know. Thus do we quite easily realize, in the question concerning the vessel described a little earlier,[325] how the vessel has to be constructed. Once all these things – placing the column in the middle, painting the bird,[326] et cetera – have been rejected as not contributing to the matter, there remains the bare difficulty consisting in the fact that all the water previously contained in the vessel flows out after it has reached a certain level. One has to inquire as to why this happens.

14. Here we are saying that the only thing worth doing, then, is to survey, in order, all the things that are given in the proposition, by rejecting those which, we shall plainly see, do not contribute to the matter, by retaining those which are necessary, and by remitting those which are doubtful to a more careful examination.

Rule Fourteen

On Representation and the Imagination

The question has to be reformulated in terms of the real extension of bodies, and, as a whole, it has to be presented to the imagination by means of bare figures – for thus will the intellect perceive it much more distinctly.[327]

1. In order that we may also use the imagination as an aid, however, one has to note that, whenever something unknown is deduced from something else already known, not on that account is some new kind of entity discovered;[328] rather, this entire knowledge is merely extended to the point where we may perceive that the thing sought participates, in this or that manner, in the nature of the things that are given in the proposition. For example, if someone is blind from birth, then we should not expect that we are ever going to be able, by means of any arguments, to get him to perceive the true ideas of colors, such as the ones which we have derived from the senses.[329] But, if someone has, at some time, seen at least the primary colors, yet never the intermediate and mixed ones, then it can happen that he may feign, through a kind of deduction, the images of those too which he has not seen, by virtue of their similarity to those which he has seen.[330] In the same way, if there is, in the magnet, some kind of entity the like of which our intellect has never before perceived, then we should not hope that we are ever going to get to know it simply by reasoning, but rather would it be necessary for us to be equipped either with some new sense or with a divine mind.

[325] Cf. § 10 of this rule.
[326] Tantalus, Aeolus, and birds were apparently popular designs for this kind of vase.
[327] Cf. the sketch of Rs. 13–16 outlined in R. 12, §§ 10–11.
[328] Cf. R. 12, §§ 6 and 24, as well as § 15 of this rule.
[329] Cf. Aristotle, *On the Soul*, 424 b 3 ff. (bk. II, ch. 12), Montaigne, 'An apology for Raymond Sebond', and AT. III. 432.
[330] To this and the previous sentence the Latin text of H contains the following marginal note: 'This example is not absolutely true, but I have not found a better one for explicating that which is true.'

potest, nos adeptos esse credemus,[230] si illam jam notorum entium sive naturarum mixturam, quae eosdem, qui in magnete apparent, effectus producat, distinctissime percipiamus.

2. Et quidem omnia haec entia jam nota, qualia sunt extensio, figura, motus, et similia, quae enumerare non est hujus loci, per eandem ideam in diversis subjectis cognoscuntur, neque aliter imaginamur figuram coronae, si sit argentea, quam si sit aurea; atque haec idea communis non aliter transfertur ex uno subjecto ad aliud, quam per simplicem comparationem, per quam affirmamus quaesitum esse secundum hoc aut illud simile, vel idem, vel aequale cuidam dato: adeo ut in omni ratiocinatione per comparationem tantum veritatem praecise agnoscamus.[231] Verbi gratia, hic: omne A est B, omne B est C, ergo omne A est[232] C; comparantur inter se quaesitum et datum, nempe A et C, secundum hoc quod utrumque sit B, etc. Sed quia, ut jam saepe mo-
[440] nuimus, syllogismorum formae nihil juvant ad | rerum veritatem percipiendam, proderit lectori si, illis plane rejectis, concipiat omnem omnino cognitionem, quae non habetur per simplicem et purum unius rei solitariae intuitum, haberi per comparationem duorum aut plurium inter se. Et quidem tota fere rationis humanae industria in hac operatione praeparanda consistit; quando enim aperta est et simplex, nullo artis adjumento, sed solius naturae lumine est opus ad veritatem, quae per illam habetur, intuendam.

3. Notandumque est, comparationes dici tantum simplices et apertas, quoties quaesitum et datum aequaliter participant quandam naturam; caeteras autem omnes non aliam ob[233] causam praeparatione indigere, quam quia natura illa communis non aequaliter est in utraque, sed secundum alias quasdam habitudines sive proportiones, in quibus involvitur; et praecipuam partem humanae industriae[234] non in alio collocari, quam in proportionibus istis eo reducendis, ut aequalitas inter quaesitum, et aliquid quod sit cognitum, clare videatur.

[230] A, AT, C, and SGZ: credemus. H: credamus.
[231] H, C, and SGZ: agnoscamus. A and AT: cognoscamus.
[232] A, AT, C, and SGZ: est. H: et.
[233] A, AT, C, and SGZ: aliam ob. Missing in H. L notes, but does not fill, the lacuna.
[234] A, AT, C, and SGZ: industriae. Missing in H. L: [ratiocinationis] humanae. N (phrase): het voornaamste deel van de menschelijke schranderheit.

However, if we perceive very distinctly that mixture of already known entities or natures which produces the same effects which appear in the magnet, then we shall believe that we have achieved whatever human natural intelligence can attain in this matter.[331]

2. Indeed, all these previously known entities, such as extension, shape, motion, and similar things – this is not the place to enumerate them –, are recognized by means of the same idea in different subjects.[332] Nor do we imagine the shape of a crown otherwise if it is silver than if it is gold. This common idea is transferred from the one subject to the other in no other way than by means of a simple comparison,[333] by means of which we affirm that what is sought is, in this or that respect, similar to, or identical with, or equal to, something given. This is so much so, that, in all reasoning, it is only by means of comparison that we recognize the truth precisely.[334] For example, all A is B, all B is C, therefore all A is C. Here the sought and the given, namely, A and C, are compared with one another with respect to the fact that both of them are B, et cetera. But, because – as we have already frequently indicated[335] – the forms of the syllogisms[336] are of no help in perceiving the truth of things, it will be to the reader's advantage if, having rejected them altogether,[337] he conceives that all knowledge whatsoever – except for that which is obtained through the simple and pure intuition of a single, solitary thing – is obtained by means of a comparison between two or more things.[338] In fact, the industry of human reason consists almost entirely in preparing this operation. For, when the operation is overt and simple, one has need, not of the help of any art, but of the light of nature alone, in order to intuit the truth which is obtained by the operation.

3. One has to note that comparisons are said to be 'simple and overt' only when the sought and the given participate equally in a certain nature;[339] that all the rest require preparation for no other reason than because the common nature is present, not equally in both, but by way of certain other relations or proportions which imply it;[340] and that the chief part of human industry consists in nothing else than in reducing these proportions to the point where there seems to be a clear equality between that which is sought and something which is known.

[331] Cf. R. 12, § 24.
[332] The general sense of 'subject' in the *Rules* is 'that of which attributes are predicated'. Thus it corresponds to what Aristotle calls 'hypokeimenon', i.e., that of which something is said, as distinguished from 'katégoroumenon', i.e., that which is said of something. Cf. *On the Categories*, 1 a 16 ff. (chs. 2–3).
[333] Cf. R. 6, §§ 1–2.
[334] From here until the end of the extant *Rules*, the notion of comparison will play a key role.
[335] Cf. R. 2, § 4, R. 4, § 2, R. 7, § 5, and R. 10, §§ 4–5.
[336] Cf. R. 2, § 3, R. 7, § 5, R. 10, § 5, and R. 13, § 1.
[337] Yet nothing about the critique of dialectical, Scholastic, and syllogistic logic in the *Rules* entails a rejection of syllogistic reasoning per se – cf., e.g., AT. VII. 522. Mainly and mostly, Descartes is criticizing Scholastic logic (1) for letting probable syllogisms play an illegitimate role in scientific research and (2) for getting so preoccupied with formal syllogisms that the growth of knowledge is thereby stunted. In other words, Descartes argues that the traditional syllogistic represents, not an instrument for, but an impediment to, the conduct of the natural intelligence in the direction of the truth (cf., e.g., R. 4, § 2).
[338] This statement is considerably relevant to the relationship between intuition and *deduction*.
[339] Cf. the definition of 'unity' in § 19 of this rule. [340] Cf. § 21 ff. of this rule as well as R. 4, § 5.

4. Notandum est deinde, nihil ad istam aequalitatem reduci posse, nisi quod recipit majus et minus, atque illud omne per magnitudinis vocabulum comprehendi: adeo ut, postquam juxta regulam praecedentem difficultatis termini ab omni subjecto abstracti sunt, hic tantum deinceps circa magnitudines in genere intelligamus nos versari.

5. Ut vero aliquid etiam tunc imaginemur, nec intellectu puro utamur, sed speciebus in phantasia depictis ; adjuto, notandum est denique, nihil dici de magnitudinibus [441] in genere, quod non etiam ad quamlibet in specie possit referri.

6. Ex quibus facile concluditur, non parum profuturum, si transferamus illa, quae de magnitudinibus in genere dici intelligemus, ad illam magnitudinis speciem, quae omnium facillime et distinctissime in imaginatione nostra pingetur: hanc vero esse extensionem realem corporis abstractam ab omni alio, quam quod sit figurata, sequitur ex dictis ad regulam duodecimam, ubi phantasiam ipsam cum ideis in illa existentibus nihil aliud esse concepimus, quam verum corpus reale extensum et figurátum. Quod per se etiam est evidens, cum in nullo alio subjecto distinctius omnes proportionum differentiae exhibeantur; quamvis enim una res dici possit magis vel minus alba quam altera, item unus sonus magis vel minus acutus, et sic de caeteris, non tamen exacte definire possumus, utrum talis excessus consistat in proportione dupla vel tripla, etc., nisi per analogiam quandam ad extensionem corporis figurati. Maneat ergo ratum et fixum, quaestiones perfecte determinatas vix ullam difficultatem continere praeter illam, quae consistit in proportionibus in aequalitates[335] evolvendis; atque illud omne, in quo praecise talis difficultas invenitur, facile posse et debere ab omni alio subjecto separari, ac deinde transferri ad extensionem et figuras, de quibus solis idcirco deinceps [442] usque ad regulam vigesimam quintam, omissa omni alia cogitatione, tractabimus.

7. Optaremus hoc in loco lectorem nancisci[336] Arithmeticae et Geometriae studiis[337] propensum, etiamsi in iisdem nondum versatum esse malim, quam vulgari more eruditum: usus enim regularum, quas hic tradam, in illis addiscendis, ad quod omnino sufficit, longe facilior est, quam in ullo[338] alio genere quaestionum; hujusque utilitas est tanta ad altiorem sapientiam consequendam, ut non verear dicere, hanc partem nostrae methodi non propter Mathematica problemata fuisse inventam, sed potius haec fere tantum hujus excolendae gratia esse addiscenda. Nihilque supponam ex istis disciplinis,

[335] A1 and C: in aequalitates, H and SGZ: in aequalitatibus, A: inaequalitatis.
[336] L, AT, C, and SGZ: nancisci, H: namisci, A: non nisi ad.
[337] H, C, and SGZ: studiis, A and AT: studia.
[338] L, A, AT, C, and SGZ: ullo, H: illo.

4. One has to note, moreover, that nothing can be reduced to such an equality except what admits of more and of less, and that all this is covered by the term 'magnitude'. This is so much so, that, after the terms of a difficulty have been abstracted from every subject in accordance with the preceding rule, we should understand that henceforth we are dealing here only with magnitudes in general.[341]

5. But, in order that we might, even then, imagine something, and make use, not of the pure intellect, but of the intellect aided by images depicted in the fantasy,[342] one has to note, finally, that nothing can be said of magnitudes in general which cannot also be ascribed to any species of magnitude whatever.

6. One easily concludes, from these things, that it will be very useful if we transfer the things which we understand to be said of magnitudes in general to that species of magnitude which gets depicted in our imagination most easily and distinctly of all.[343] But, that this species is the real extension of a body, abstracted from everything else other than that it is shaped, follows from the things said in the twelfth rule,[344] where we conceived that this fantasy, along with the ideas existing in it, is nothing other than a real body, really extended and shaped. This is also self-evident, since in no other subject are all the differences of the proportions exhibited more distinctly. For, although one thing could be said to be more or less white than another, and, likewise, one sound, more or less sharp than another, and the same holds for the other cases, we still cannot determine exactly whether the greater exceeds the lesser in a proportion of two to one or of three to one, et cetera, except by means of a certain analogy with the extension of a shaped body. It remains firm and fixed, then, that perfectly determinate questions[345] contain hardly any difficulty at all besides that which consists in developing proportions in equalities, and that everything in which precisely such a difficulty is found can easily be, and ought to be, separated from every other subject, and then reformulated in terms of extension and figures.[346] Accordingly, we shall henceforth treat of these alone, thinking of nothing else, until the twenty-fifth rule.[347]

7. We would be glad, at this point, to encounter a reader favorably disposed toward the study of arithmetic and of geometry, even though I would rather that he had not yet been involved in these disciplines than that he had been taught them in the vulgar manner. For the employment of the rules which I am here expounding is much easier in the study of these sciences, for which that employment is completely sufficient, than in any other kind of question. The utility of this employment in the pursuit of a more profound wisdom is also so great that I do not hesitate to say that this part[348] of our method was not designed for the sake of mathematical problems, but rather that mathematical problems have to be studied almost exclusively for the sake of cultivating the method.[349] I shall presuppose nothing from these disciplines, except perhaps for certain

[341] Cf. R. 13, § 1.
[342] Thus does Descartes refocus the reader's attention on the core program of this rule itself.
[343] Cf. § 13 of this rule. [344] Cf. §§ 6, 8, and 11 of that rule. [345] Cf. R. 13, § 1.
[346] Cf. § 13 of this rule as well as R. 12, § 11.
[347] This remark is more evidence that this part of the *Rules* is planned to end at R. 24.
[348] I.e., 'Book Two' or Rs. 13–24 on the 'perfectly understood questions' of mathematics.
[349] Thus method, mathematics – which may assume the pregnant form of *mathesis universalis* (cf. R. 4, §§ 5–6) –, and universal wisdom (*sapientia universalis* – cf. R. 1, § 1) are clearly three distinct things. On the relationship between method and mathematics cf. *Discourse*, pt. II, §§ 11–13, and pt. III, § 6.

nisi forte quaedam per se[239] nota et unicuique obvia; sed earundem cognitio, sicut ab aliis solet haberi, etiamsi nullis apertis erroribus sit corrupta, plurimis tamen obliquis et male conceptis principiis obscuratur, quae passim in sequentibus emendare conabimur.

8. Per extensionem intelligimus, illud omne quod habet longitudinem, latitudinem, et profunditatem, non inquirentes, sive sit verum corpus, sive spatium tantum; nec majori explicatione indigere videtur, cum nihil omnino facilius ab imaginatione nostra percipiatur. Quia tamen saepe litterati tam acutis utuntur distinctionibus, ut lumen naturale dissipent, et tenebras inveniant etiam in illis quae a rusticis nunquam ignorantur: monendi sunt, hic per extensionem non distinctum quid et ab ipso subjecto separatum designari, neque in universum nos agnoscere ejusmodi entia philosophica, quae revera sub imaginationem non cadunt. Nam etiamsi aliquis sibi persuadere possit, ex. causa, si ad nihilum reducatur quidquid est extensum in rerum natura, [443] | non repugnare interim, ipsam extensionem per se solam existere, non utetur tamen[240] ideâ corporea ad hunc conceptum, sed solo intellectu male judicante. Quod ipse fatebitur, si attente reflectat ad illam ipsam extensionis imaginem, quam tunc in phantasia sua fingere conabitur: advertet enim, se eandem non percipere omni subjecto destitutam, sed omnino aliter imaginari quam judicet; adeo ut illa entia abstracta (quidquid credat intellectus de rei veritate) nunquam tamen in phantasia a subjectis separata formentur.

9. Quia vero deinceps nihil sine imaginationis auxilio sumus acturi, operae pretium est caute distinguere, per quas ideas singulae verborum significationes intellectui nostro sint proponendae. Quamobrem has tres loquendi formas considerandas proponimus: *extensio occupat locum, corpus habet extensionem, et extensio non est corpus.*

10. Quarum prima ostendit, quomodo extensio sumatur pro eo quod est extensum: idem enim plane concipio, si dicam: *extensio occupat locum*, quam si dicam: *extensum occupat locum*. Neque tamen idcirco, ad fugiendam ambiguitatem, voce *extensum* uti melius est: non enim tam distincte significaret id quod concipimus, nempe subjectum aliquod occupare locum, quia extensum est; possetque aliquis interpretari tantum:

[239] I., A, AT, C, and SGZ: se. Missing in H. N (phrase): door zich bekent.
[240] H, I., AT, and C: tamen. A and SGZ: tunc.

things known per se and accessible to everyone. But the knowledge of these things which others tend to have, even if it is not vitiated by any overt errors, is still obscured by many oblique and ill-conceived principles, which we shall endeavor to emend throughout the following remarks.[350]

8. By 'extension' we understand all that which has length, breadth, and depth, without inquiring as to whether it is a real body or merely a space;[351] nor does this notion seem to need any further explication, for nothing at all is more easily perceived by our imagination. However, because the learned often employ such subtle distinctions that they dissipate the natural light, and that they find obscurities even in the things of which peasants are never ignorant,[352] they have to be advised that the term 'extension' here does not designate something distinct and separate from the subject itself,[353] and that we do not, in general, recognize philosophical entities of the sort which do not really fall under the purview of the imagination. For, although someone might convince himself, for example, that it is not contradictory that extension per se could exist all by itself even if, in the meantime, whatever is extended in the nature of things were annihilated, still, for this conception, he would be employing, not a corporeal idea, but the intellect alone judging incorrectly.[354] He will admit this himself if he attentively reflects on that very image of extension which he will then try to feign in his fantasy. For he will realize that he does not perceive it in isolation from every subject, but rather that he imagines it completely differently from how he would judge about it. This is so much so, that, whatever the intellect may believe about the truth of the matter,[355] these abstract entities are still never formed in the fantasy in separation from subjects.

9. But, because henceforth we are not going to be dealing with anything without the aid of the imagination, it is worthwhile to distinguish carefully those ideas by means of which the individual meanings of words are to be presented to our intellect. For this purpose, we are proposing for consideration these three manners of speaking: 'extension occupies a place', 'body possesses extension', and 'extension is not body'.

10. The first manner of speaking shows how 'extension' may be taken for 'that which is extended'. For, if I say, 'extension occupies a place', then I am plainly conceiving the same thing as if I say, 'that which is extended occupies a place'. Still, it is not better, on this account, to use the expression, 'that which is extended', for the purpose of avoiding ambiguity, for it would not signify so distinctly what we are conceiving, namely, that some subject occupies a place because it is extended. Also, someone

[350] Cf. esp. §§ 13–14 of this rule.
[351] According to Descartes, extension (*extensio*) in length, breadth, and depth is the defining feature of body (matter) or corporeal substance (*res extensa*), as distinguished from mind or thinking substance (*res cogitans*), whose defining property is consciousness (*cogitatio*) – cf., e.g., *Meditations*, M. II, passim, and esp. *Principles*, pt. II, §§ 4, 8, 11–12, and 64.
[352] Cf. R. 12, § 23.
[353] Cf. §§ 16–17 of this rule.
[354] To be sure, there are those who think that Descartes' reluctance to ascribe physical reality to space in general and to empty space in particular is utterly incomprehensible. None the less, Albert Einstein is not among them – cf. his *Relativity: The Special and the General Theory*, trans. R. W. Lawson (New York, 1916/1961), pp. 156–158 and 177.
[355] Cf. §§ 12, 13, 18, etc., of this rule.

extensum esse subjectum occupans locum, non aliter quam si dicerem: *animatum occupat locum*. Quae ratio explicat, quare hic de extensione nos acturos esse dixerimus, potius quam de extenso, etiamsi eandem non aliter concipiendam esse putemus[241] quam
[444] extensum.|

11. Jam pergamus ad haec verba: *corpus habet extensionem*, ubi *extensionem* aliud quidem significare intelligimus quam corpus; non tamen duas distinctas ideas in phantasia nostra formamus, unam corporis, aliam extensionis, sed unicam tantum corporis extensi; nec aliud est a parte rei, quam si dicerem: *corpus est extensum*; vel potius: *extensum est extensum*. Quod peculiare est istis entibus, quae in alio tantum sunt, nec unquam sine subjecto concipi possunt;[242] aliterque contingit in illis, quae a subjectis realiter distinguuntur: nam si dicerem, verbi gratia: *Petrus habet divitias*, plane diversa est idea Petri ab illa divitiarum; item si dicerem: *Paulus est dives*, omnino aliud imaginarer, quam si dicerem:[243] *dives est dives*. Quam diversitatem plerique non distinguentes falso opinantur, extensionem continere aliquid distinctum ab eo quod est extensum, sicut divitiae Pauli aliud sunt quam Paulus.

12. Denique si dicatur: *extensio non est corpus*, tunc extensionis vocabulum longe aliter sumitur quam supra; atque in hac significatione nulla illi peculiaris idea in phantasia correspondet, sed tota haec enuntiatio ab intellectu puro perficitur, qui solus habet facultatem ejusmodi entia abstracta separandi. Quod plerisque erroris occasio est, qui non advertentes[244] extensionem ita sumptam non posse ab imaginatione comprehendi, illam sibi per veram ideam repraesentant; qualis idea cum necessario involvat corporis conceptum, si dicant extensionem ita conceptam non esse corpus, imprudenter impli-
[445] cantur in eo, quod *idem | simul sit corpus et non corpus*. Et magni est momenti distinguere enuntiationes, in quibus ejusmodi nomina: *extensio*, *figura*, *numerus*, *superficies*, *linea*, *punctum*, *unitas*, etc., tam strictam habent significationem, ut aliquid excludant, a quo revera non sunt distincta,[245] ut cum dicitur: *extensio*, vel *figura non est corpus*; *numerus non est res numerata*; *superficies est terminus corporis*, *linea superficiei*, *punctum lineae*; *unitas non est quantitas*, etc. Quae omnes et similes propositiones ab imaginatione omnino removendae sunt, ut sint[246] verae; quamobrem de illis in sequentibus non sumus acturi.

13. Notandumque est diligenter, in omnibus aliis propositionibus, in quibus haec nomina, quamvis significationem eandem retineant, dicanturque eodem modo a subjectis abstracta, nihil tamen excludunt vel negant, a quo non realiter distinguantur,

[241] H, C, and SGZ: putemus. A and AT: putamus.
[242] A, AT, and C: possunt. H and SGZ: possint.
[243] A, AT, C, and SGZ: dicerem. H: dicam.
[244] H, C, and SGZ: advertentes. A and AT: animadvertentes.
[245] C and SGZ: distincta. H, A, and AT: distinctae.
[246] H, AT, C, and SGZ: ut sint. A: ut sint licet. N: als of ... waren.

might interpret the sentence simply as saying that 'that which is extended is a subject occupying a place', not otherwise than if I said that 'that which is animate occupies a place'. This reason explains why we have said[356] that here we would be dealing with extension rather than with that which is extended, even though we think that extension is not to be conceived otherwise than is that which is extended.

11. Let us now proceed to the second manner of speaking: 'body possesses extension'. Here, to be sure, we understand 'extension' to signify something other than 'body'; none the less, we form, in our fantasy, not two distinct ideas, the one of body, and the other of extension, but rather just the single idea of extended body. So far as the fact of the matter is concerned, it is no different from if I said, 'body is extended', or, better, 'that which is extended is extended'. This is peculiar to those entities which exist only in something else, and which can never be conceived without a subject. But it turns out otherwise in the case of those entities which are really distinguishable from their subjects. For, if I said, for example, 'Peter has wealth', then the idea of Peter is completely different from the idea of wealth. Once again, if I said, 'Paul is wealthy', then I would be imagining something completely different from what I would be if I said, 'the wealthy man is wealthy'. Many, not making this distinction and not recognizing this difference, are of the false opinion that extension contains something distinct from that which is extended, just as Paul's wealth is something different from Paul.

12. Finally, if one says, 'extension is not body', then the term 'extension' is being taken here in a way very different from the way in which it was being taken above,[357] and, in this sense, no particular idea corresponds to it in the fantasy. Rather, this entire utterance is achieved by the pure intellect, which alone has the ability to separate out abstract entities of this sort. This is an occasion of error for many, who, not realizing that extension, thus taken, cannot be comprehended by the imagination, represent it to themselves by means of a real idea. Now, since such an idea necessarily involves the concept of body, if they say that extension, thus conceived, is not body, then they are unwittingly implicated into saying, 'the same thing is at the same time body and not body'.[358] It is very important to distinguish utterances in which such terms as 'extension', 'shape', 'number', 'surface', 'line', 'point', 'unity', et cetera, possess such a restricted signification that they exclude something from which they are not really distinct, such as, for example, when one says: 'extension, or shape, is not body', 'a number is not the thing numbered', 'a surface is the limit of a body',[359] 'a line is the limit of a surface',[360] 'a point is the limit of a line',[361] 'unity is not a quantity', et cetera. All these and similar propositions have to be completely removed from the realm of the imagination, in order that they may be true. For this reason, we are not going to be concerned with them in the following remarks.

13. One has to note carefully that, in the case of all other propositions in which these terms, although they retain the same meaning and they are employed in the same manner abstracted from subjects, still exclude nothing or deny nothing from which

[356] Cf. § 6 of this rule. [357] Cf. §§ 6, 8, and 11 of this rule. [358] I.e., they are contradicting themselves.
[359] This is, of course, not Euclid's definition, which is (see *The Elements*, bk. I, def. 5): 'A surface [*epiphaneia*] is that which has length and breadth only.'
[360] But cf. Euclid, *The Elements*, bk. I, def. 2: 'A line [*grammē*] is breadthless length.'
[361] Once again, cf. Euclid, *The Elements*, bk. I, def. 1: 'A point [*sēmeion*] is that which has no part.'

imaginationis adjumento nos uti posse et debere: quia tunc,[247] etiamsi intellectus praecise tantum attendat ad illud quod verbo designatur, imaginatio tamen veram rei ideam fingere debet, ut ad ejus alias conditiones vocabulo non expressas, si quando usus exigat, idem intellectus possit converti, nec illas unquam imprudenter judicet fuisse exclusas. Ut si de numero sit quaestio, imaginemur subjectum aliquod per multas unitates mensurabile, ad cujus solam multitudinem licet intellectus in praesenti reflectat, cavebimus tamen ne inde postea aliquid concludat, in quo res numerata a nostro conceptu
[446] exclusa fuisse supponatur: sicuti faciunt illi, qui numeris mira | tribuunt mysteria et meras nugas, quibus certe non tantam adhiberent fidem, nisi numerum a rebus numeratis distinctum esse conciperent. Item, si agamus de figura, putemus nos agere de subjecto extenso, sub hac tantum ratione concepto, quod sit figuratum; si de corpore, putemus nos agere de eodem, ut longum, latum et profundum;[248] si de superficie, concipiamus idem,[249] ut longum et latum,[250] omissa profunditate, non negata; si de linea, ut longum tantum; si de puncto, idem omisso omni alio, praeterquam quod sit ens.

14. Quae omnia quamvis fuse hic deducam, ita tamen praeoccupata sunt mortalium ingenia, ut verear adhuc, ne valde pauci hac in parte ab omni errandi periculo sint satis tuti, explicationemque mei sensus nimis brevem in longo sermone reperiant; ipsae enim artes Arithmetica et Geometria, quamvis omnium certissimae, nos tamen hic fallunt: quis enim Logista numeros suos ab omni subjecto, non modo per intellectum abstractos, sed per imaginationem etiam vere distinguendos esse non putat? quis Geometra repugnantibus principiis objecti sui evidentiam non confundit, dum lineas carere latitudine judicat, et superficies profunditate, quas tamen easdem postea unas ex aliis componit, non advertens lineam, ex cujus fluxu superficiem fieri concipit, esse verum corpus; illam autem, quae latitudine caret, non esse nisi corporis modum, etc.? Sed ne in his recensendis diutius immoremur, brevius erit exponere, quo pacto nostrum
[447] objectum concipien|dum esse supponamus, ut de illo, quidquid[251] in Arithmeticis et Geometricis inest veritatis, quam facillime demonstremus.

15. Hic ergo versamur circa objectum extensum, nihil plane aliud in eo considerantes praeter ipsam extensionem, abstinentesque[252] de industria a vocabulo quantitatis, quia tam subtiles sunt quidam Philosophi, ut illam quoque ab extensione distinxerint; sed quaestiones omnes eo deductas esse supponimus, ut nihil aliud quaeratur, quam quaedam extensio cognoscenda ex eo, quod comparetur cum quadam alia extensione

[247] A, AT, C, and SGZ: tunc. Missing in H.
[248] H, C, and SGZ: longum, latum et profundum. A and AT: longo, lato et profundo.
[249] AT, C, and SGZ: idem. H and A: item.
[250] A, AT, C, and SGZ: longum et latum. H: longa et lata.
[251] A, AT, and C: quidquid. H and SGZ: quid.
[252] A, AT, C, and SGZ: abstinentesque. H: abstinentes.

they are not really distinct, we can and should make use of the help of the imagination. This is because, although the intellect then attends solely and precisely to what the word designates, the imagination still ought to feign a real idea of the thing, in order that, if the need should ever arise, the same intellect can be directed toward the other features of the thing which are not expressed by the term, and in order that the intellect may never imprudently judge these features to have been excluded. Thus, if there is a question about number, then we should imagine some subject measurable by way of many units. Of course, the intellect may, at present, be reflecting only on this set; still, we shall beware that it does not, afterwards, draw from this some conclusion which implies that the thing numbered has been excluded from our conception. This is what those do who attribute miraculous and mysterious properties to numbers – sheer inanities, in which they would certainly not believe so firmly, unless they did conceive number to be something distinct from the things numbered. Likewise, when we are dealing with a figure, we should bear in mind that we are dealing with an extended subject, conceived only under the aspect of the fact that it is shaped; when we are dealing with a body, we should bear in mind that we are dealing with the same thing as having length, breadth, and depth; when we are dealing with a surface, we should conceive the same thing as having length and breadth – omitting, but not denying, depth; when we are dealing with a line, we should conceive the same thing merely as having length; and, when we are dealing with a point, we should conceive the same thing, but we should have omitted every other aspect of it except that it is an entity.[w]

14. Although I am deducing all these things in detail here, the natural intelligence of mortals is still so preoccupied that I am afraid, never the less, that very few are secure enough from all danger of losing their way in this area, and that most will find my speech too long and the explication of my meaning too brief. After all, arithmetic and geometry themselves, although the most certain of all the arts, still mislead us here. For is there an arithmetician who does not think, not only that his numbers are abstracted from every subject by means of the intellect, but also that they are even to be really distinguished from every subject by means of the imagination? And is there a geometer who does not confound the evidence of his object by means of contradictory principles when he judges that lines lack breadth and surfaces lack depth, yet then goes on to construct the ones from the others, not realizing that the line whose flow he conceives as generating a surface is a real body, whereas that line which lacks breadth is nothing but a mode of body? But, so that we might not spend any more time reviewing these matters, it will be quicker to explain how, we are supposing, our object is to be conceived, in order that we may demonstrate as easily as possible what truth there is in arithmetic and in geometry.

15. Here we are concerned, therefore, with an extended object, considering nothing else at all about it besides the extension itself, and industriously refraining from the use of the term 'quantity' because some philosophers are so subtle that they have even distinguished quantity from extension. Rather, we are supposing that all questions have been reduced to the point where nothing else is being sought but a certain extension, a certain extension to be known from the fact that it is compared with some other

[w] Cf. § 18 of this rule.

cognita. Cum enim hic nullius novi entis cognitionem expectemus, sed velimus duntaxat proportiones quantumcumque involutas eo reducere, ut illud, quod est ignotum, aequale cuidam cognito reperiatur: certum est omnes proportionum differentias, quaecumque in aliis subjectis existunt, etiam inter duas vel plures extensiones posse inveniri; ac proinde sufficit ad nostrum institutum, si in ipsa extensione illa omnia consideremus, quae ad proportionum differentias exponendas possunt juvare, qualia occurrunt tantum tria, nempe dimensio, unitas, et figura.

16. Per dimensionem, nihil aliud intelligimus, quam modum et rationem, secundum quam aliquod subjectum consideratur esse mensurabile: adeo ut non solum longitudo, latitudo, et profunditas sint dimensiones corporis, sed etiam gravitas sit dimensio, secundum quam subjecta ponderantur, celeritas sit dimensio motus, et alia ejusmodi
[448] infinita. Nam divisio ipsa in | plures partes aequales, sive sit realis, sive intellectualis tantum, est proprie dimensio secundum quam res numeramus; et modus ille, qui numerum facit, proprie dicitur esse species dimensionis, quamvis sit aliqua diversitas in significatione nominis. Si enim consideramus partes in ordine ad totum, tunc numerare dicimur;[353] si contra totum spectamus[354] ut in partes distributum, illud metimur: e.g., saecula metimur annis, diebus, horis, et momentis; si autem numeremus momenta, horas,[355] dies et annos, saecula tandem implebimus.

17. Ex quibus patet, infinitas esse posse in eodem subjecto dimensiones diversas, illasque nihil prorsus superaddere rebus dimensis, sed eodem modo intelligi, sive habeant fundamentum reale in ipsis subjectis, sive ex arbitrio mentis nostrae fuerint excogitatae. Est enim aliquid reale gravitas corporis, vel celeritas motus, vel divisio saeculi in annos et dies; non autem diei divisio in horas et momenta, etc. Quae tamen omnia eodem modo se habent, si considerentur tantum sub ratione dimensionis, ut hic et in Mathematicis disciplinis est faciendum; pertinet enim magis ad Physicos examinare, utrum illarum fundamentum sit reale.

18. Cujus rei animadversio magnam Geometriae adfert lucem, quoniam in illa fere omnes male concipiunt tres species quantitatis: lineam, superficiem, et corpus. Jam enim ante notatum[356] est, lineam et superficiem non cadere sub conceptum ut vere dis-
[449] tinctas a corpore, | vel ab invicem; si vero considerentur simpliciter, ut per intellectum abstractae, tunc non magis diversae sunt species quantitatis, quam animal et vivens in homine sunt diversae species substantiae. Obiterque notandum est, tres corporum dimensiones, longitudinem, latitudinem, et profunditatem, nomine tenus ab invicem discrepare: nihil enim vetat, in solido aliquo dato, utramlibet extensionem pro longitudine eligere, aliam pro latitudine, etc. Atque quamvis hae tres duntaxat in omni re

[353] A, AT, C, and SGZ: dicimur. H: dicimus.
[354] H, AT, C, and SGZ: spectamus. A: spectemus.
[355] H, AT, C, and SGZ: horas. Missing in A.
[356] C and SGZ: notatum. H: notatu[m]. A and AT: relatum. N: aangemerkt.

extension already known. For, since we are not expecting knowledge of any new entity here,[363] but rather do we only want to reduce the proportions, however complicated, to the point where what is unknown may be found equal to something known, it is certain that all the differences of proportions which exist in other subjects can also be found between two or more extensions.[364] Hence it suffices, for our purpose, if we consider all the features of extension itself which can assist us in exposing differences of proportions. There are only three such features, namely, dimension, unity, and shape.

16. By 'dimension' we understand nothing other than a mode with respect to which and an aspect in accordance with which some subject is considered to be measurable. Thus length, breadth, and depth are not the only dimensions of a body, but rather is weight also such a dimension – the dimension in terms of which objects are weighed; speed is a dimension – the dimension of motion; and there is an infinite number of other instances of this sort. For the division itself into several equal parts, whether it be real or merely conceptual, is, strictly speaking, the dimension in terms of which we count things; and the mode which gives rise to number is, strictly speaking, a species of dimension, although there is some difference between the meanings of the two terms. For, if we consider the order of the parts in relation to the whole, then we are said to be 'counting' them; on the other hand, if we regard the whole as being divided up into parts, then we are 'measuring' it. For example, we measure centuries in terms of years, days, hours, and minutes; however, if we count minutes, hours, days, and years, then we shall end up with centuries.

17. From these considerations, it is obvious that there can be an infinite number of different dimensions within the same subject, and that these dimensions add absolutely nothing to the things that possess them, but rather that they are understood in the same way whether they have a real basis in these subjects themselves or they have been thought out by the arbitrariness of our mind. For the weight of a body is something real, and so too is the speed of a motion, or the division of a century into years and into days; but the division of the day into hours and into minutes, et cetera, is not.[365] Yet all these function in the same way if they are considered only under the rubric of dimension, as one has to do here and in the mathematical disciplines. For it pertains rather to the physicists to examine whether the bases of dimensions are real.

18. Attention to this matter throws much light on geometry, since in that discipline almost all mistakenly conceive three species of quantity: the line, the surface, and the solid. For it has already been noted above[366] that the line and the surface are not conceived as being really distinct from the solid or from one another. Indeed, if they are considered simply, as abstracted by the intellect, then they are no more different species of quantity than 'animal' and 'living' in the human being are different species of substance.[367] One has to note, in passing, that the three dimensions of body – length, breadth, and depth – differ from each other only nominally. For nothing prevents one from selecting, in any given solid, any extension whatever as the length, another, as the breadth, et cetera. Although these three dimensions, of course, have a real basis in

[363] Cf. § 1 of this rule as well as R. 12, §§ 6 and 24.
[364] Cf. §§ 1–6, esp. 6, of this rule.
[365] But isn't the 'century' as conventional a unit as are the 'hour' and the 'minute'?
[366] I.e., in § 13 of this rule.
[367] Cf. §§ 10–11 of this rule.

extensa, ut extensa simpliciter, reale habeant fundamentum, non tamen hic illas magis spectamus, quam alias infinitas, quae vel finguntur ab intellectu, vel alia in rebus habent fundamenta: ut in triangulo, si illud perfecte velimus dimetiri, tria a parte rei noscenda sunt, nempe vel tria latera, vel duo latera et unus angulus, vel duo anguli et area, etc.; item in trapezio quinque, sex in tetraëdro, etc.; quae omnia dici possunt dimensiones. Ut autem hic illas eligamus, quibus maxime imaginatio nostra adjuvatur, nunquam ad plures quam unam vel duas in phantasia nostra depictas simul attendemus,[257] etiamsi intelligamus in propositione, circa quam versabimur, quotlibet alias existere; artis enim est ita illas in quam plurimas distinguere, ut nonnisi ad paucissimas simul, sed tamen successive ad omnes, advertamus.

19. Unitas est natura illa communis, quam supra diximus debere aequaliter partici-
[450] pari ab illis omnibus, quae inter se comparantur. Et nisi aliqua jam sit determinata in quaestione, possumus pro illa assumere, sive unam ex magnitudinibus jam datis, sive aliam quamcumque, et erit communis aliarum omnium mensura; atque in illa intelligemus[258] tot esse dimensiones, quot in ipsis extremis, quae inter se erunt comparanda. eandemque concipiemus, vel simpliciter ut extensum quid, abstrahendo ab omni alio, tuneque idem erit cum puncto Geometrarum, dum ex ejus fluxu lineam componunt, vel ut lineam quandam, vel ut quadratum.

20. Quod attinet ad figuras, jam supra ostensum est, quomodo per illas solas rerum omnium ideae fingi possint;[259] superestque hoc in loco admonendum, ex innumeris illarum speciebus diversis, nos illis tantum hic usuros, quibus facillime omnes habitudinum sive proportionum differentiae exprimuntur. Sunt autem duo duntaxat genera rerum, quae inter se conferuntur, multitudines et magnitudines; habemusque etiam duo genera figurarum ad illas conceptui nostro exponendas;[260] nam, ver. gr., puncta

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quibus numerus triangularis[261] designatur, vel arbor, quae alicujus prosapiam explicat

pater.

filius, filia.

[257] H, AT, C, and SGZ: attendemus. A: extendemus.
[258] AT and C: intelligemus. H, A, and SGZ: intelligimus.
[259] H, AT, C, and SGZ: possint. A: possunt.
[260] H, C, and SGZ: exponendas. A and AT: proponendas. N: voor te stellen.
[261] AT, C, and SGZ: triangularis. H: Triang. A: triangulorum. N: driehoek. In the margin N also has: Triangulus.

every extended thing simply as extended, we are still no more concerned with them here than with the infinite number of others which either are feigned by the intellect or have some other bases in things. Thus, in the case of a triangle, if we wish to measure it exactly, then we have to know, on the side of the thing itself, three things, namely, either its three sides, or two sides and one angle, or two angles and its area, et cetera. Likewise, in the case of a trapezium, we have to know five aspects of it; in the case of a tetrahedron, six; et cetera. These aspects can all be called 'dimensions'. But, in order that we might here select those dimensions which help our imagination the most, we should never simultaneously attend to more than to one or two of them as depicted in our fantasy, even though we understand that there is an indefinite number of others in the proposition with which we shall be involved. For it is a matter of art to distinguish as many dimensions as possible in such a way that, while we may attend to very few simultaneously, we might still attend to all of them successively.[257]

19. Unity is the common nature in which, as we have said above,[258] all the things that are compared with one another must participate equally.[259] Unless some unit is already determined in the question, we can assume as unit either one of the magnitudes already given or any other magnitude, and this will be the common measure of all the others. We shall understand there to be as many dimensions in it as in the extreme terms which we shall have to compare with one another, and we shall conceive it either simply as something extended, by abstracting it from everything else – in which case it will be the same as a geometrical point, from whose flow the geometers construct a line –, or as some sort of line, or as a square.

20. As far as figures are concerned, we have already shown above[259] how the ideas of all things can be feigned by means of them alone. At this point, it remains to be pointed out that, of the innumerable different species of figures, we are here going to use only those by means of which all the differences of relations or of proportions are most readily expressed. Yet there are just two kinds of things which are compared with one another, to wit, sets and magnitudes, and we also have two kinds of figures for displaying these to our conception. Thus, for example, the points

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. . .

which represent a triangular number,[272] or the tree

father.

son. daughter.

[256] Cf. § 24 of this rule as well as R. 16, § 1.
[257] Cf. § 2 ff. of this rule.
[258] Cf. Euclid, *The Elements*, bk. VII, def. 1: 'A unit [*monas*] is that by virtue of which each of the things that exist is called "one".'
[259] Cf. R. 12, § 6.
[272] 'Triangular' numbers would appear to be those which can be arranged in the form of a triangle when they are expressed as a set of points, e.g., 3, 6, 10, etc.

[451] etc., sunt figurae ad multitudinem exhibendam; illae autem, quae continuae sunt et indivisae, ut △, □tum, etc., magnitudines explicant.

21. Jam vero ut exponamus, quibusnam ex illis omnibus hic simus usuri, sciendum est, omnes habitudines, quae inter entia ejusdem generis esse possunt, ad duo capita esse referendas, nempe ad ordinem, vel ad mensuram.[262]

22. Sciendum praeterea, in ordine quidem excogitando non parum esse industriae, ut passim videre est in hac methodo, quae fere nihil aliud docet; in ordine autem cognoscendo, postquam inventus[263] est, nullam prorsus difficultatem contineri, sed facile nos posse juxta regulam septimam singulas partes ordinatas mente percurrere, quia scili cet in hoc habitudinum genere una ad alia[264] referuntur ex se solis, non autem mediante tertio, ut fit in mensuris, de quibus ideirco evolvendis tantum hic tractamus: agnosco enim, quis sit ordo inter A et B, nullo alio considerato praeter utrumque extremum; non autem agnosco, quae sit proportio magnitudinis inter duo et tria, nisi considerato quodam tertio, nempe unitate, quae utriusque est communis mensura.

[452] 23. Sciendum etiam, magnitudines continuas beneficio | unitatis assumptitiae posse totas interdum ad multitudinem reduci, et semper saltem ex parte; atque multitudinem unitatum posse postea tali ordine disponi, ut difficultas, quae ad mensurae cognitionem pertineat, tandem a solius ordinis inspectione dependeat, maximumque in hoc progressu esse artis adjumentum.

24. Sciendum est[265] denique, ex dimensionibus magnitudinis continuae nullas plane distinctius concipi, quam longitudinem et latitudinem, neque ad plures simul in eadem figura esse attendendum, ut duo diversa inter se comparemus; quoniam artis[266] est, si plura quam duo diversa inter se comparanda habeamus, illa successive percurrere, et ad duo duntaxat simul attendere.

25. Quibus animadversis, facile colligitur: hic non minus esse abstrahendas propositiones ab ipsis figuris, de quibus Geometrae tractant, si de illis sit quaestio, quam ab alia quavis materia; nullasque ad hunc usum esse retinendas praeter superficies rectilineas et rectangulas, vel lineas rectas, quas figuras quoque appellamus, quia per illas non minus imaginamur subjectum vere extensum quam per superficies, ut supra dictum est; ac denique per easdem figuras, modo magnitudines continuas, modo etiam multitudinem

[262] Here the division of the text into paragraphs follows A, AT, and C. Neither H nor SGZ presents § 21 in the form of an independent paragraph, the former by not distinguishing it from § 20, and the latter by not distinguishing it from § 22. In this SGZ also follows N.

[263] I, C, and SGZ: inventus. H: inventu[us]. A and AT: inventum.

[264] H, C, and SGZ: una ad alia. A and AT: unae ad alias. N: 't een tot 't ander.

[265] A, AT, C, and SGZ: est. Missing in H.

[266] A, AT, C, and SGZ: artis. H (?): artis. I.: satis. N: tot de kunst.

which explicates someone's genealogy, et cetera, are figures for exhibiting sets, while those figures which are continuous and undivided, such as a △, a □, et cetera, illustrate magnitudes.

21. Now, however, in order that we may explain which, of all the available figures, we shall be using here, one has to know that all the relations which can obtain between entities of the same kind are to be placed under two headings, namely, either under order or under measure.[373]

22. One has to know, also, that, to be sure, there is much industry involved in thinking out an order – as can be seen throughout in this method, which teaches almost nothing else – but that, none the less, there is no difficulty whatsoever in recognizing an order after it has been discovered. Rather, by following the seventh rule,[374] we can easily survey, in the mind, the individual parts ordered, because, namely, in relations of this kind, the parts are related to one another on the basis of themselves alone, and not by way of a mediating third term, as happens in the case of measures, of whose development alone we are therefore treating here. For I do recognize what the order between A and B is without having considered anything besides these two extreme terms, but I do not recognize what the proportion of magnitude between 2 and 3 is without having considered some third term, namely, the unit which is the common measure of both.

23. One has to know, furthermore, that it is sometimes possible, with the benefit of the unit assumed, completely to reduce continuous magnitudes to a set, and that this is always possible at least in part, as well as that the set of units can then be arranged in such an order that the difficulty regarding the knowledge of a measure ultimately depends solely on an inspection of the order, and that the greatest assistance of the art lies in this progression.

24. One has to know, finally, that none of the dimensions of a continuous magnitude is more distinctly conceived than are length and breadth, and that we are not to attend to more than to these two dimensions at the same time in the same figure, in order that we might compare two different things with one another, since, if we have more than two different things that have to be compared with one another, then it is a matter of art to survey them successively and to attend to no more than to two of them simultaneously.[375]

25. Once one has realized these things, one easily gathers that here propositions are to be abstracted from the figures of which the geometers treat, if the question has to do with these, no less than from any other matter whatever;[376] and that no figures are to be retained for this purpose other than rectilinear and rectangular surfaces, or straight lines, which we also call 'figures', because, as has been said above,[377] it is by means of these, no less than by means of surfaces, that we imagine a really extended subject; and, finally, that, by means of these same figures, sometimes continuous magnitudes,

[373] Cf. § 3 of this rule as well as R. 4, § 5, and R. 16, § 5.

[374] This appears to be a reference to R. 7 itself.

[375] Cf. § 18 of this rule as well as R. 16, § 1.

[376] Cf. R. 13 itself.

[377] Cf. §§ 13 and 18 of this rule.

sive numerum esse exhibendum; neque quidquam simplicius, ad omnes habitudinum
[453] differentias exponendas, inveniri posse ab humana industria. |

Regula XV

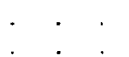
De repraesentatione et sensibus

Juvat etiam plerumque has figuras describere et sensibus exhibere externis, ut hac ratione facilius nostra cogitatio retineatur attenta.

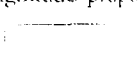
1. Quomodo autem illae pingendae sint, ut distinctius, dum oculis ipsis proponentur, illarum species in imaginatione nostra formentur, per se est evidens:[267] nam primo unitatem pingemus tribus modis, nempe per □, tum, si attendamus ad illam ut longam et latam, vel per lineam, _____ , si consideremus tantum ut longam, vel denique per punctum, . , si non aliud spectemus quam quod ex illa componatur multitudo; at quocumque modo pingatur et concipiatur, intelligemus semper eandem esse subjectum ommmode extensum et infinitarum dimensionum[268] capax. Ita etiam terminos propositionis, si ad duas simul illorum magnitudines diversas attendendum sit, oculis exhibebimus per rectangulum, cujus[269] duo latera erunt duae magnitudines propositae: hoc modo

siquidem [in]commensurabiles[270] sint cum unitate, vel hoc

sive hoc



[454] si commensurabiles sint; nec amplius nisi de unitatum multitudine sit quaestio. Si | denique ad unam tantum illorum magnitudinem attendamus, pingemus lineam[271] vel per □,[272] cujus unum latus sit magnitudo proposita, et aliud sit unitas, hoc modo



quod fit quoties eadem linea[273] cum aliqua superficie est comparanda; vel per longitu-

[267] AT, C, and SGZ: est evidens. H: est videns. A: evidens. N (phrase): blijkt uit zich zelf.
[268] A, AT, C, and SGZ: dimensionum. Missing in H.
[269] H, AT, C, and SGZ: cujus. A: cujus loco. N: in welks plaats.
[270] C and SGZ: [in]commensurabiles. H and A: commensurabiles. AT: incommensurabiles. N: meetbaar.
[271] H, A, C, and SGZ: lineam. AT: illam.
[272] Cf. H, A, and C. AT and SGZ: rectangulum. N: driehoek.
[273] H, A, C, and SGZ: linea. Missing in AT. N: lijn.

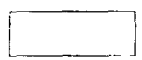
sometimes a set or a number, also have to be exhibited.[378] Human industry cannot come up with anything simpler for expressing all the differences of relations.[379]

Rule Fifteen

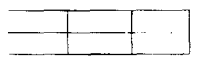
On Representation and the Senses

In most cases, it also helps to draw these figures and to display them to the external senses, in order that, in this way, our thought may be more easily held attentive.[380]

1. But it is self-evident how these figures are to be depicted in order that their images may be formed more distinctly in our imagination in that they are presented to the eyes themselves. For, to begin with, we shall depict the unit in three ways, namely: by means of a square, □ , if we regard it only as having length and breadth; or by means of a line, _____ , if we regard it only as having length; or, finally, by means of a point, . , if we consider nothing else but that it makes up a set. But, however it is depicted and conceived, we shall always understand the unit to be a subject extended in every manner and capable of an infinite number of dimensions. In the same way, too, if we have to attend simultaneously to two different magnitudes of the terms of a proposition, then we shall present these terms to the eyes by means of a rectangle, two sides of which will be the two magnitudes proposed, thus:



if they are incommensurable with the unit; or thus:



or thus:

if they are commensurable with it – and nothing more is needed, except where the question is about a set of units. Finally, if we are looking at just one of the magnitudes of the terms, then we shall depict the line, either by means of a □, one side of which is the proposed magnitude, and another side of which is the unit, thus:

– which is done whenever the same line is to be compared with some surface; or by

[378] Cf. § 20 of this rule.
[379] This entire paragraph is an anticipation of the following rules. R. 14 has gotten progressively serious about the program of representing mathematical operations by means of the representation of line lengths. R. 15 recommends that, 'in most cases', such representation be 'intuitive' (*sit venia verbo*). R. 16 proposes that, 'in some cases', such representation be 'symbolic'.
[380] Cf. the sketch of Rs. 13–16 outlined in R. 12, §§ 10–11.

dinem solam, hoc pacto ———— , si spectetur tantum ut longitudo incommensurabilis; vel hoc pacto . . . . . si sit multitudo.

Regula XVI

De repraesentatione et memoria

Quae vero praesentem mentis attentionem non requirunt, etiamsi ad conclusionem necessaria sint, illa melius est per brevissimas notas designare quam per integras figuras: ita enim memoria non poterit falli, nec tamen interim cogitatio distrahetur ad haec retinenda, dum aliis deducendis incumbit.

1. Caeterum, quia non plures quam duas dimensiones diversas, ex innumeris quae in phantasia nostra pingi possunt, uno et eodem, sive oculorum, sive mentis intuitu contemplandas esse diximus: operae pretium est alias omnes ita retinere, ut facile occurrant quoties usus exiget;[274] in quem finem memoria videtur a natura instituta. Sed quia haec saepe labilis est, et ne aliquam attentionis nostrae partem in eadem renovanda cogamur impendere, dum aliis cogitationibus incumbimus, aptissime scribendi usum ars adinve-
[455] nit: cujus | ope freti, hic nihil prorsus memoriae committemus, sed liberam et totam praesentibus ideis phantasiam relinquentes, quaecunque erunt retinenda in charta pingemus; idque per brevissimas notas, ut postquam singula distincte inspexerimus juxta regulam nonam,[275] possimus juxta undecimam omnia celerrimo cogitationis motu percurrere et quamplurima simul intueri.

2. Quidquid ergo ut unum ad difficultatis solutionem erit spectandum, per unicam notam designabimus, quae fingi potest ad libitum. Sed, facilitatis causa, utemur characteribus, *a*, *b*, *c*, etc., ad magnitudines jam cognitas, et A, B,[276] C, etc., ad incognitas exprimendas; quibus saepe notas numerorum, 2,[277] 3, 4, etc., praefigemus ad illarum multitudinem explicandam, et iterum subjungemus ad numerum relationum, quae in

[274] H, C, and SGZ: exiget. A and AT: exigit.
[275] A, AT, C, and SGZ: nonam. Missing in H. L notes, but does not fill, the lacuna. N: negende.
[276] A, AT, C, and SGZ: B. Missing in H.
[277] H, N, C, and SGZ: 2. A and AT: 1, 2.

means of a length alone, thus, ———— , if we are viewing it simply as an incommensurable length; or thus, ... , if it is a set.

Rule Sixteen

On Representation and the Memory

But, as for the things which, even if they are necessary for the conclusion, do not require the present attention of the mind, it is better to represent them by very concise symbols rather than by complete figures – for thus will it be impossible for the memory to be misled, nor yet will thought be distracted in the interim by having to retain these things while it is involved in deducing other matters.[381]

1. By the way, because we have said[382] that, of the innumerable different dimensions which can be depicted in our fantasy, no more than two are to be contemplated in one and the same ocular or mental intuition, it is worthwhile to retain all the others in such a way that they readily occur to us whenever the need arises. The memory seems to have been instituted by nature to this end. But, because memory is often shaky,[383] and so that we might not be forced to spend some part of our attention on refreshing it while we are engaged with other thoughts,[384] art has most conveniently invented the practice of writing.[385] Relying on this as an aid, we shall here commit nothing at all to memory; rather, relinquishing the fantasy freely and completely to the ideas present to it, we shall put down on paper whatever things have to be retained.[386] And we shall do this by means of very concise symbols,[387] in order that, after we have distinctly inspected individual items, in accordance with the ninth rule,[388] we may be able, in accordance with the eleventh rule,[389] to run through them all with the swiftest movement of thought[390] and to intuit simultaneously as many as possible.

2. Therefore, whatever is to be viewed as one thing for the solution of the difficulty we shall designate by a single symbol, which can be formed in any way desired. But we shall, for the sake of convenience, employ the letters *a*, *b*, *c*, et cetera, to express magnitudes already known, and A, B, C, et cetera, to express magnitudes unknown, to which we shall often prefix the numerical symbols 2, 3, 4, et cetera, to indicate how many of them there are, and to which, once again, we shall often append the numerical symbols to indicate the number of relations which they are to be understood to

[381] Cf. the sketch of Rs. 13–16 outlined in R. 12, §§ 10–11.
[382] Cf. R. 14, §§ 18 and 24.
[383] This is a recurring theme in the *Rules* – cf., e.g., R. 3, § 8, R. 11, §§ 2 and 4, etc.
[384] In R. 7, § 1, the main aim is also to reduce the importance of the role of the memory.
[385] Cf., on the other hand, the seminal discussion of the double-edged relationship between writing, remembering, and forgetfulness in Plato, *Phaedrus*, 274 b ff. For a seminal statement of the 'deconstructionist' critique of the 'logocentric', 'phonocentric', and 'ontocentric' view of writing as a means to the 'phenomenocentric' end of preserving the presence of 'the things themselves' as well as of their corresponding 'meanings' cf. esp. Jacques Derrida, *De la grammatologie* (Paris, 1967), *L'écriture et la différence* (Paris, 1967), *La voix et le phénomène. Introduction au problème du signe dans la phénoménologie de Husserl* (Paris, 1967), 'Différance', *Bulletin de la société française de philosophie*, vol. LXII, no. 3 (1968), pp. 73–101, etc.
[386] Cf. § 6 of this rule.
[387] Cf. *Discourse*, pt. II, § 11.
[388] I.e., R. 9 itself.
[389] I.e., R. 11 itself.
[390] Cf. R. 3, § 8, R. 7, R. 7, § 1, R. 11, and R. 11, §§ 3–4.

iisdem erunt intelligendae: ut si scribam $2a^3$, idem erit ac si dicerem duplum magnitudinis notatae per litteram *a*, tres relationes continentis. Atque hac industria non modo multorum verborum compendium faciemus, sed, quod praecipuum est, difficultatis terminos ita puros et nudos exhibebimus ut, etiamsi nihil utile omittatur, nihil tamen unquam in illis inveniatur superfluum, et quod frustra ingenii capacitatem occupet, dum plura simul erunt mente complectenda.

3. Quae omnia ut clarius intelligantur, primo advertendum est, Logistas consuevisse singulas magnitudines per plures unitates, sive per aliquem numerum designare, nos autem hoc in loco non minus abstrahere ab ipsis numeris, quam paulo ante a figuris
[456] Geometricis, vel quavis alia re. Quod agimus, tum ut longae et superfluae supputationis taedium vitemus, tum praecipue, ut partes subjecti, quae ad difficultatis naturam pertinent, maneant semper distinctae, neque numeris inutilibus involvantur: ut si quaeratur basis trianguli rectanguli, cujus latera data sint 9 et 12, dicet Logista illam esse $\sqrt{225}$ vel 15; nos vero pro 9 et 12 ponemus *a* et *b*, inveniemusque basim esse $\sqrt{aa+bb}$, manebuntque distinctae illae duae partes a^2 et b^2, quae in numero sunt confusae.

4. Advertendum est etiam, per numerum relationum intelligendas esse proportiones illas[278] se continua serie[279] subsequentes, quas alii in vulgari Algebra per plures dimensiones et figuras conantur exprimere, et quarum primam vocant radicem, secundam ⌜ tum, tertiam cubum, quartam biquadratum, etc. A quibus nominibus me ipsum longo tempore deceptum fuisse confiteor: nihil enim videbatur imaginationi meae clarius posse proponi post lineam et quadratum, quam cubus et aliae figurae ad harum similitudinem effictae; et non paucas quidem difficultates harum[280] auxilio resolvebam. Sed tandem post multa experimenta deprehendi, me nihil unquam per istum concipiendi modum invenisse, quod longe facilius et distinctius absque illo non potuissem agnoscere: atque omnino rejicienda esse talia nomina, ne conceptum turbent, quoniam eadem magnitudo, quamvis cubus vel biquadratum vocetur, nunquam tamen aliter quam ut li-
[457] nea vel superficies imaginationi est proponenda juxta regulam ⁞ praecedentem. Maxime[281] igitur est notandum, radicem, quadratum,[282] cubum, etc., nihil aliud esse quam magnitudines continue proportionales, quibus semper praeposita esse supponitur unitas illa assumptitia, de qua jam supra sumus locuti: ad quam unitatem prima proportionalis refertur immediate et per unicam relationem; secunda vero, mediante prima, atque idcirco per duas relationes; tertia, mediante prima et secunda, et per tres relationes, etc.

[278] H, C, and SGZ: illas. Missing in A and in AT.
[279] H, C, and SGZ: continua serie. A and AT: continuo ordine. N: in een gedurige reeks.
[280] H, C, and SGZ: harum. A and AT: horum.
[281] A, AT, C, and SGZ: Maxime. Missing in H. N: voornamelijk.
[282] AT, C, and SGZ: quadratum. H and A: quadratam. N: vierkant.

contain. Thus, if I write '$2a^3$', then that will be the same as if I were to say 'twice the magnitude symbolized by the letter *a*, which magnitude contains three relations'. By means of this device, we shall not only be saving a lot of words, but – which is the important point – we shall also be displaying the terms of the difficulty so purely and so barely that, although nothing useful would be omitted from them, nothing superfluous is ever found in them either – nothing which might needlessly occupy the capacity of the natural intelligence while the mind is having to encompass many things at once.

3. In order that all these points may be more clearly understood, one has to realize, first, that arithmeticians have become accustomed to designating individual magnitudes by several units or by some number, whereas we are abstracting in this place from numbers themselves no less than we did a little while ago[391] from geometrical figures or from anything else. We are doing this, both in order that we may avoid the tedium of long and superfluous calculation, and, above all, in order that the parts of the subject which are relevant to the nature of the difficulty may always remain distinct and in order that they may not get involved in useless numerical expressions. Thus, if one is seeking the hypotenuse of a right-angled triangle whose given sides are 9 and 12, then the arithmetician will say that it is $\sqrt{225}$ or 15, but we will substitute *a* and *b* for 9 and 12, and we will find the hypotenuse to be $\sqrt{aa+bb}$, so that these two parts, a^2 and b^2, which are conflated in the numerical expression, will remain distinct.

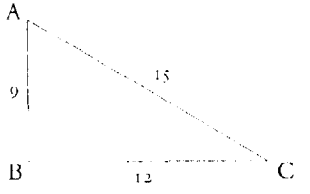
4. One has to realize, also, that by the number of relations are to be understood those proportions which follow each other in a continuous series, which proportions others endeavor to express, in the vulgar algebra, by means of various dimensions and figures, the first of which they call 'the root', the second, 'the square', the third, 'the cube', the fourth, 'the square of the square', et cetera. I confess that I myself have, for a long time, been misled by these expressions. For nothing seemed to be able to be more clearly presented to my imagination, after the line and the square, than the cube and the other figures feigned in accordance with a similarity to these. To be sure, I resolved many difficulties with the help of them. None the less, I finally came to realize, after many trials, that I had never discovered anything with this manner of conception which I could not have recognized much more easily and distinctly without it, as well as that such terms have to be completely abandoned, so that they do not confuse the conception. For a given magnitude, even though it is called 'a cube' or 'the square of the square', is still never to be presented to the imagination otherwise than as a line or as a surface, in accordance with the preceding rule.[392] Therefore, one has to note, above all, that the root, the square, the cube, et cetera, are nothing other than magnitudes in continued proportion, which, it is supposed, are always preceded by that assumed unit about which we have already spoken above.[393] The first proportional is related to this unit immediately and by means of a single relation; the second proportional, on the other hand, is related to it by means of the first, which mediates, and hence by means of two relations; the third proportional is related to it by means of the first and the second, which mediate, and thus by means of three relations, et cetera.[394]

[391] Cf. R. 14, §§ 18 and 25.
[392] This statement appears to treat §§ 24–25 of R. 14 and § 1 of R. 15 as composing one rule.
[393] Cf. R. 14, § 19 ff.
[394] The point here is to express, e.g., the series, *a*, a^2, a^3, etc., as $1 \times a$, $a \times a$, $a^2 \times a$, etc.

Vocabimus ergo deinceps primam proportionalem, magnitudinem illam, quae in Algebra dicitur radix; secundam proportionalem, illam, quae dicitur □tum, et ita de caeteris.

5. Denique advertendum est, etiamsi hic a quibusdam numeris abstrahamus difficultatis terminos ad examinandam ejus naturam, saepe tamen contingere, illam simpliciori modo resolvi posse in numeris datis, quam si ab illis fuerit abstracta: quod fit per duplicem numerorum usum, quem jam ante attigimus, quia scilicet iidem explicant, modo ordinem, modo mensuram; ac proinde, postquam illam generalibus terminis expressam quaesivimus, oportet eandem ad datos numeros revocare, ut videamus utrum forte aliquam simpliciorem solutionem nobis illi[283] suppeditent: ver. gr., postquam basim trianguli rectanguli ex lateribus a et b vidimus esse $\sqrt{a^2+b^2}$, pro a^2 ponendum est[284] 81, et pro b^2, 144, quae, addita, sunt 225, cujus radix sive media proportionalis inter unitatem
|458| et 225 est 15; unde | cognoscemus basim 15 esse commensurabilem lateribus 9 et 12, non generaliter ex eo quod sit basis □li △li, cujus unum latus est ad aliud, ut 3 ad 4. Quae omnia distinguimus, nos qui rerum cognitionem evidentem et distinctam quaerimus, non autem Logistae, qui contenti sunt, si occurrat illis summa quaesita, etiamsi non animadvertant quomodo eadem dependeat ex datis, in quo tamen uno scientia proprie consistit.

6. At vero generaliter observandum est, nulla unquam memoriae esse mandanda ex iis, quae perpetuam attentionem non requirunt, si possimus ea in charta deponere, ne scilicet aliquam ingenii nostri partem objecti praesentis cognitioni supervacua recordatio surripiat; et index quidem faciendus est, in quo terminos quaestionis, ut prima vice erunt propositi, scribemus; deinde quomodo iidem abstrahantur, et per quas notas designentur, ut, postquam in ipsis notis solutio fuerit reperta, eandem facile, sine ullo memoriae adjumento, ad subjectum particulare, de quo erit quaestio, applicemus: nihil enim unquam abstractum est nisi ex aliquo minus generali. Scribam igitur hoc modo:



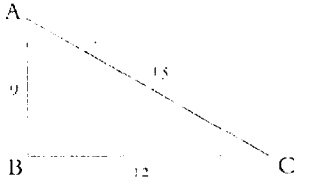
quaeritur basis AC in △lo └┘lo ABC,[285] et abstraho difficultatem, ut generaliter

[283] H, C, and SGZ: illi. A and AT: ibi.
[284] C and SGZ: est. H, A, and AT: esse.
[285] Cf. C, which conforms to H and to A. AT: AC in triangulo rectangulo ABC. SGZ: *AC* in triangulo rectangulo *ABC*. N: BC in de rechthoekige driehoek ABC.

Henceforth, therefore, the magnitude which is referred to in algebra as 'the root' we shall call 'the first proportional'; the magnitude which is referred to there as 'the square' we shall call 'the second proportional'; and the same holds for the other cases.

5. One has to realize, finally, that, even though here we are abstracting the terms of a difficulty from certain numbers in order to examine its nature, yet it often happens that the difficulty can be resolved in a simpler way in the given numbers than if it has been abstracted from them. This happens by way of the dual function of numbers, which we have already mentioned,[395] namely, because they express sometimes order, sometimes measure. For this reason, after we have investigated the difficulty expressed in general terms, we should reformulate it in terms of given numbers, in order that we may see whether these might perhaps provide us with some simpler solution. For example, after we have seen that the hypotenuse of a right-angled triangle with the sides a and b is $\sqrt{a^2+b^2}$, 81 has to be substituted for a^2, and 144, for b^2, which, added together, yield 225, whose root, or the mean proportional between the unit and 225, is 15. From this, we shall recognize that the hypotenuse, whose length is 15, is commensurable with the other sides, whose lengths are 9 and 12, respectively; this we shall not recognize generally from the fact that it is the hypotenuse of a right-angled triangle of which the one side is to the other as 3 is to 4. All these things do we distinguish, we who are seeking an evident and distinct knowledge of things – but not the arithmeticians, who are content if the sum which they are seeking happens to occur to them, even though they do not realize how it depends on the data. Yet knowledge, strictly speaking, consists in this alone.

6. But one has to observe, in general, that none of those things which do not demand constant attention is ever to be committed to memory if we can put it down on paper, namely, so that a superfluous recollection may not distract any part of our natural intelligence from the knowledge of the present object.[396] We even have to make a list in which we write down, first, the terms of the question as they were proposed in the first place, then, the way in which they may be abstracted, and, finally, by which symbols they may be designated, in order that, after the solution has been found in terms of these symbols, we may easily apply it to the particular subject about which the question is, without any assistance of memory. For one always abstracts something more general from something less general. I shall write down, then, the following:



What is being sought is the hypotenuse, AC, of the right-angled triangle ABC: First I abstract the difficulty, so that, in general, the magnitude of the hypotenuse is sought

[395] Cf. R. 4, § 5, and R. 14, §§ 3 and 20–21 ff.
[396] Cf. § 1 of this rule.

quaeratur magnitudo basis ex magnitudinibus laterum; deinde[286] pro AB, quod est 9,
[459] pono *a*, pro BC, quod est 12, pono *b*, et sic de caeteris. |

7. Notandumque est, his quatuor regulis nos adhuc usuros in tertia parte hujus tractatus, et paulo latius sumptis, quam hic fuerint explicatae, ut dicetur suo loco.

Regula XVII

De resolutione indirecta quaestionum

Proposita difficultas directe[287] est percurrenda, abstrahendo ab eo quod quidam ejus termini sint cogniti, alii incogniti, et mutuam singulorum ab aliis dependentiam per veros discursus intuendo.

1. Superiores quatuor regulae docuerunt, quomodo determinatae difficultates et perfecte intellectae a singulis subjectis abstrahendae sint, et eo reducendae, ut nihil aliud quaeratur postea, quam magnitudines quaedam cognoscendae, ex eo, quod per hanc vel illam habitudinem[288] referantur[289] ad quasdam datas. Jam vero in his quinque regulis sequentibus exponemus, quomodo eaedem difficultates ita sint subigendae, ut quotcumque erunt in una propositione magnitudines ignotae sibi invicem omnes subordinentur, et quemadmodum prima erit ad unitatem, ita secunda sit ad primam, tertia ad secundam, quarta ad tertiam, et sic consequenter, si tam multae sint, summam faciant aequalem magnitudini cuidam cognitae; idque methodo tam certa, ut hoc pacto tute asseramus, illas nulla industria ad simpliciores terminos reduci potuisse.

2. Quoad praesentem vero, notandum est, in omni quaestione per deductionem
[460] resolvenda quandam esse | viam planam et directam, per quam omnium facillime ex unis terminis ad alios transire possumus, caeteras[290] autem omnes esse difficiliores et indirectas. Ad quod intelligendum, meminisse oportet eorum quae dicta sunt ad regulam undecimam, ubi exposuimus, qualis sit catenatio propositionum,[291] quarum singulae si cum vicinis conferantur, facile percipimus, quomodo etiam prima et ultima se invicem respiciant, etiamsi non tam facile ab extremis intermedias deducamus. Nunc igitur si dependentiam singularum ab invicem, nullibi interrupto ordine, intueamur, ut inde inferamus quomodo ultima a prima dependeat,[292] difficultatem directe percurremus; sed contra, si ex eo, quod primam et ultimam certo modo inter se connexas esse cognoscemus, vellemus deducere quales sint mediae quae illas conjungunt, hunc[293]

[286] A, AT, C, and SGZ: deinde. Missing in H.
[287] A, AT, C, and SGZ: directe. H: directa.
[288] H, A, AT, C, and SGZ: habitudinem. N: groothen.
[289] A, AT, C, and SGZ: referantur. H: referatur.
[290] AT, C, and SGZ: caeteras … indirectas. H and A: caeteros … indirectos. N: maar dat alle d'andere zwaarder, en met regel recht zijn.
[291] A, AT, C, and SGZ: propositionum. H: proportionum. N: der voorstellingen.
[292] A, AT, C, and SGZ: dependeat. H: dependeant.
[293] A, AT, and C: hunc. H and SGZ: tunc.

from the magnitudes of the other sides; then I substitute *a* for AB, which is 9, and *b* for BC, which is 12; and the same holds for the other cases.

7. One has to note that, in the third part of this treatise,[397] we are going to make further use of these four rules,[398] taken in a somewhat broader sense than they have been given here, as we shall say in the appropriate place.[399]

Rule Seventeen

On the Indirect Resolution of Questions

The proposed difficulty has to be run through directly, by abstracting from the fact that some of its terms are known and others are unknown, and by intuiting, through sound discursive reasoning, the mutual dependence of individual terms.

1. The preceding four rules have shown[400] how determinate and perfectly understood difficulties are to be abstracted from individual subjects as well as how they are to be reduced to the point where one is afterwards seeking nothing other than to recognize certain magnitudes on the basis of the fact that they bear this or that relation to certain given magnitudes. But now, in the following five rules,[401] we shall explain, first, how these same difficulties are to be dealt with in such a way that, however many unknown magnitudes there are in a single proposition, they can all be subordinated to one another; then, how the first will be to the unit as the second is to the first, as the third is to the second, as the fourth is to the third, and so on subsequently; and, finally, that, however many of them there are, they yield a sum equal to some known magnitude. This will be done according to a method so certain that, in this way, we may safely assert that no effort could have reduced the magnitudes to simpler terms.

2. For the present, however, one has to note that, in every question to be resolved through deduction, there is a plain and direct way by which we can most easily of all pass from one term to another, but that all the other ways are more difficult and indirect. In order to understand this, it is necessary to remember the things that have been said in the eleventh rule,[402] where we have explained of what quality the chain of propositions is with respect to whose individual propositions, when they are compared with the neighboring ones, we easily perceive how even the first and the last are related to one another, even if we cannot so easily deduce the intermediate ones from the extreme ones.[403] Now, if we intuit the dependence of the individual propositions on one another without any interruption of the order, so that we may infer from this how the last one depends on the first, then we are running through the difficulty directly. But, on the other hand, if, from the fact that we know the first and the last propositions to be interconnected in a certain way, we wish to deduce of what kind the intermedi-

[397] On the structure and on the content of the *Rules* cf. R. 12, § 27, and R. 8, § 10.
[398] Cf. the sketch of Rs. 13–16 outlined in R. 12, §§ 10–11.
[399] A locus not extant.
[400] Cf., once again, the sketch, outlined in R. 12, §§ 10–11, of Rs. 13–16 as building a unit.
[401] The *Rules* break off after the statement of the last rule referred to here.
[402] Cf. not only R. 11, § 5, but also R. 6, § 9.
[403] Cf. R. 11, § 1 ff.

omnino ordinem indirectum et praeposterum sequeremur. Quia vero hic versamur tantum circa quaestiones involutas, in quibus scilicet ab extremis[294] cognitis quaedam intermedia turbato ordine sunt cognoscenda, totum hujus loci artificium consistet in eo, quod ignota pro cognitis supponendo, possimus facilem et directam quaerendi viam nobis praeparare,[295] etiam in difficultatibus quantumcumque intricatis; neque quidquam impedit quominus id semper fiat, cum supposuerimus ab initio hujus partis, nos
[461] agnoscere eorum, quae in quaestione sunt ignota, talem esse depen|dentiam a cognitis, ut plane ab illis sint determinata, adeo ut si reflectamus ad illa ipsa, quae primum occurrunt, dum illam[296] determinationem agnoscimus, et eadem licet ignota inter cognita numeremus, ut ex illis gradatim et per veros discursus caetera omnia etiam cognita, quasi essent ignota, deducamus, totum id quod haec regula praecipit, exequemur: cujus rei exempla, ut etiam plurimorum ex iis quae deinceps sumus dicturi, ad regulam vicesimam quartam reservamus, quoniam ibi commodius exponentur.[297]

Regula XVIII

De operationibus algebrae geometricae

Ad hoc quatuor tantum operationes requiruntur, additio, subtractio, multiplicatio, et divisio; ex quibus duae ultimae saepe hic non sunt absolvendae, tum ne quid temere involvatur, tum quia facilius postea perfici possunt.

1. Multitudo regularum saepe ex Doctoris imperitia procedit, et quae ad unicum generale praeceptum possent reduci, minus perspicua sunt si in multa particularia dividantur: quamobrem hic nos operationes omnes, quibus utendum est in quaestionibus percurrendis, id est, in quibusdam magnitudinibus ex aliis deducendis, ad quatuor tan-
[462] tum capita redigimus; quae quomodo sufficiant, ex ipsorum explicatione cognoscetur. |

2. Nempe si ad unius magnitudinis cognitionem perveniamus, ex eo quod habemus partes ex quibus componitur, id fit per additionem; si agnoscamus partem ex eo quod habemus totum, et excessum totius supra eandem partem, hoc fit per subtractionem; neque pluribus modis aliqua magnitudo ex aliis absolute sumptis, et in quibus aliquo

[294] H, AT, C, and SGZ: extremis. A: externis. N: uittersten.
[295] H, C, and SGZ: praeparare. A and AT: proponere. N: bereiden.
[296] A, AT, C, and SGZ: illam ... ex. Missing in H.
[297] A, AT, C, and SGZ: exponentur. H: ponentur. N: verklaart zullen worden.

ate ones are which connect them, then we are following a completely indirect order and the reverse order of the previous one.[404] Yet, because we are here concerned only with complicated questions, in which, namely, certain intermediate propositions have to be recognized, in a confused order, from known extreme propositions, the entire artifice consists in the fact that, by supposing the unknown ones to be known, we may enable ourselves to prepare the easy and direct way of inquiry – even in the most complicated difficulties. Nothing prevents us from always doing this, since we have been presupposing, from the start of this part of the treatise,[405] that we recognize that the dependence of the unknown terms in the question on the known ones is such that the former are completely determined by the latter. This is so much so, that, if we reflect on the terms which occur to us first, while we are recognizing this determination, and if we reckon them, even though unknown, among the known, in order that, from these terms, we may deduce, step by step and through sound discursive reasoning, all the other terms, even the known ones as if they were unknown, then we shall be executing all that which this rule prescribes. Examples of this matter, as well as of most of the things that we are henceforth going to say, we are reserving for the twenty-fourth rule, since it will be more convenient to expound them there.[406]

Rule Eighteen

On the Operations of Geometrical Algebra

For this purpose, only four operations are required, namely, addition, subtraction, multiplication, and division, the latter two of which are often to be dispensed with here, on the one hand, so that one may not get blindly involved in anything, and, on the other hand, because they can be more easily carried out later.

1. A multitude of rules is often a result of the inexperience of the teacher. Things that can be reduced to a single general precept are less perspicuous if they are divided up among many particular ones. For this reason, we are here bringing under just four headings all the operations which have to be used for running through questions, that is, for deducing some magnitudes from others. How these are sufficient, will be recognized from the account of them.[407]

2. Namely, if we arrive at the knowledge of one magnitude[408] from the fact that we have the parts of which it is composed, then this happens through addition; if we recognize a part from the fact that we have the whole, and that we have the excess of the whole over the part, then this happens through subtraction.[409] There are no other ways

[404] Cf. R. 6, § 9, and R. 11, § 5.
[405] I.e., in 'part two', or, in other words, from R. 13 until now.
[406] Of course, the *Rules* do not get this far.
[407] This entire paragraph is loudly echoed in *Discourse*, pt. II, §§ 6–10 (cf. also ibid., § 1), raising the intriguing issue of whether the four rules of the method listed there are not modeled – at least in a certain metaphorical sense – on the four operations of the mathematics outlined here: R. 1 (epoché) – subtraction; R. 2 (analysis, resolution) – division; R. 3 (composition, synthesis) – addition; and R. 4 (enumeration) – multiplication.
[408] Cf. R. 14, § 23.
[409] Cf. R. 12, § 26, and R. 13, § 4.

modo contineatur, potest deduci. Si vero aliqua invenienda[298] sit ex aliis a quibus sit plane diversa, et in quibus nullo modo contineatur, necesse est ut ad illas aliqua ratione referatur: atque haec relatio sive habitudo, si sit directe persequenda, tunc utendum est multiplicatione; si indirecte, divisione.

3. Quae duo ut clare exponantur, sciendum est unitatem,[299] de qua jam sumus locuti, hic esse basim et fundamentum omnium relationum, atque in serie magnitudinum continue proportionalium primum gradum occupare,[300] datas autem magnitudines in secundo gradu contineri, et in tertio, quarto, et reliquis quaesitas, si propositio[301] sit directa; si vero indirecta, quaesitam in secundo et aliis intermediis gradibus conti-
|463| neri, et datam in ultimo. |

4. Nam si dicatur, ut unitas ad *a* vel ad 5 datam, ita *b* sive 7 data ad quaesitam, quae est *ab* vel 35, tunc *a* et *b* sunt in secundo gradu, et (*ab*), quae producitur ex illis, in tertio. Item si addatur, ut unitas ad *c* vel 9, ita *ab* vel 35 ad quaesitam *abc* vel 315, tunc *abc* est in quarto gradu, et generatur per duas multiplicationes ex *ab* et *c*, quae sunt in secundo gradu, et sic de reliquis. Item, ut unitas ad *a* [vel] 5, ita *a* [vel] 5 ad a^2 sive[302] 25; et rursum, ut unitas ad *a* [vel] 5, ita a^2 [vel] 25 ad a^3 [vel] 125; et denique, ut unitas ad *a* [vel] 5, sic a^3 [303] [vel] 125 ad a^4 quod est 625, etc.:[304] neque enim aliter fit multiplicatio, si eadem magnitudo ducatur per se ipsam, quam si per aliam plane diversam duceretur.

5. Jam vero si dicatur, ut unitas ad *a* vel 5 datum divisorem, ita B vel 7 quaesita ad *ab* vel 35 datum dividendum, tunc est ordo turbatus et indirectus: quapropter B quaesita non habetur, nisi dividendo *ab* datam per *a* etiam datam. Item, si dicatur, ut unitas ad A vel 5 quaesitam, ita A vel 5 quaesita ad a^2 vel 25 datam; sive, ut unitas ad A [vel] 5 quaesitam, sic A^2 vel 25 etiam[305] quaesita ad a^3 vel 125 datam; et sic de caeteris. Haec omnia complectimur sub nomine divisionis, quamvis[306] notandum sit has posteriores hujus speciei majorem continere difficultatem quam priores, quia saepius in illis reperitur[307] magnitudo quaesita, quae proinde plures relationes involvit. Idem enim est
|464| horum exemplorum sensus, ac si diceretur extrahendam esse radicem qua |dratam ex a^2 sive [ex] 25,[308] vel cubicam[309] ex a^3 sive ex 125, et sic de caeteris; qui mos loquendi est apud Logistas usitatus. Vel ut etiam Geometrarum terminis illas explicemus, idem est ac

[298] H, AT, C, and SGZ: invenienda. A: intermedia. N (clause): Maar indien men enige grootheit uit anderen, van dewelke zy gantschelijk verscheiden is, en in dewelke zy geensins is begreepen, moet vinden.
[299] H, AT, C, and SGZ: unitatem. A: veritatem. N: d'eenheit.
[300] H, C, and SGZ: occupare. A and AT: obtinere. N: bekleed.
[301] H, A, and SGZ: propositio. AT and C: proportio. N: voorstelling.
[302] AT, C, and SGZ: sive ... |second| a^3. Missing in H. For A see next note too.
[303] AT, C, and SGZ: a^3. A: a^2. N: a^3.
[304] Cf. AT and C in the repeated placement of '[vel]', which is missing in H and in A. SGZ compensates by putting '5', '25', '125', etc. in parentheses. See the following paragraph as well.
[305] H, C, and SGZ: etiam. Missing in A and in AT.
[306] A, AT, C, and SGZ: quamvis. Missing in H. L: licet.
[307] A, AT, C, and SGZ: reperitur. H: repetitur. N: gevonden word.
[308] AT and C: sive |ex| 25. H, A, and SGZ: sive 25.
[309] A, AT, C, and SGZ: cubicam ... etiam. Missing in H.

in which one magnitude can be deduced from other magnitudes which are taken absolutely and which somehow contain it. But, if some magnitude is to be found from others, from which it is quite different and in which it is in no way contained, then it is necessary that it be related to them in some way. If this relation or connection is to be pursued directly, then one has to use multiplication; if indirectly, then division.

3. In order that these two operations may be clearly explained, one has to know that the unit, about which we have already spoken,[410] is here the basis and the foundation of all relations, as well as that it occupies the first place in a series of magnitudes in continued proportion, but that the given magnitudes occupy the second place in the series, and the sought magnitudes, the third, the fourth, and the remaining places, if the proposition is a direct one; on the other hand, if the proposition is an indirect one,[411] then the sought magnitude occupies the second and the other intermediate places, and the given magnitude, the last.

4. For, if it is said that, as the unit is to *a* or to a given magnitude 5, so *b* or the given magnitude 7 is to the sought magnitude,[412] which is *ab* or 35, then *a* and *b* occupy the second place, and *ab*, which is their product, occupies the third.[413] Once again, if it is added that, as the unit is to *c* or 9, so *ab* or 35 is to the sought magnitude, *abc* or 315, then *abc* occupies the fourth place, and it is produced by the two multiplications with respect to *ab* and *c*, which occupy the second place;[414] and the same holds for the other cases. Once again, as the unit is to *a* or 5, so *a* or 5 is to a^2 or 25; and, likewise, as the unit is to *a* or 5, so a^2 or 25 is to a^3 or 125; and, finally, as the unit is to *a* or 5, so a^3 or 125 is to a^4 or 625, et cetera. For, if a magnitude is multiplied by itself, then the multiplication is not done differently from when the same is multiplied by another, completely different, magnitude.

5. But now, if it is said that, as the unit is to a given divisor, *a* or 5, so the sought magnitude, B or 7, is to the given dividend, *ab* or 35, then the order is confused and indirect,[415] which is why B, the sought magnitude, cannot be obtained except by dividing *ab*, the given magnitude, by *a*, also a given magnitude. The same holds if it is said that, as the unit is to A or 5, the sought magnitude, so A or 5, the sought magnitude, is to a^2 or 25, the given magnitude; or that, as the unit is to A or 5, the sought magnitude, so A^2 or 25, the sought magnitude, is also to a^3 or 125, the given magnitude; and the same holds for the other cases. We are including all these instances under the term 'division', although one has to note that the latter specimens of division are more difficult than the former, because the sought magnitude occurs more frequently in them, which therefore involves more relations. For the significance of these examples is the same as if one said – which is the usual manner of speaking among the arithmeticians – that 'the square root of a^2 or 25 is to be extracted', or that 'the cube root of a^3 or 125 is to be extracted', and the same holds for the other cases. In other words, to explain these examples in the terms of the geometers as well, it is the same as if one said

[410] Cf. R. 14, § 19, and R. 16, § 4.
[411] On 'direct' and 'indirect' propositions cf. R. 6, § 9, R. 11, § 5, and R. 17, §§ 1–2.
[412] Descartes does not yet use capital letters for unknown quantities. Cf. R. 16, § 2.
[413] The formula here is: 1:*a* :: *a*:*x*.
[414] The formula here is: 1:*c* :: *ab*:*x*.
[415] From now on Descartes does use capital letters for unknown magnitudes. Cf. R. 16, § 2.

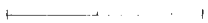
si diceretur inveniendam esse mediam proportionalem inter magnitudinem illam assumptitiam, quam unitatem appellamus,[310] et illam quae designatur per a^2, vel duas medias proportionales inter unitatem et a^3, et ita de aliis.

6. Ex quibus facile colligitur, quomodo hae duae operationes sufficiant ad magnitudines quascumque inveniendas, quae propter aliquam relationem ex aliis sint deducendae. Atque his intellectis, sequitur ut exponamus quomodo hae operationes ad imaginationis examina[311] sint revocandae, et quomodo etiam ipsis oculis exhibendae, ut tandem postea illarum usum sive praxim explicemus.

7. Si additio[312] vel subtractio faciendae sint, concipimus subjectum sub ratione lineae, sive sub ratione magnitudinis extensae, in qua sola longitudo est spectanda: nam si addenda sit linea *a*

ad lineam *b*

unam alteri adjungimus hoc modo *ab*



et producitur *c*

[465] | Si autem minor ex majori tollenda sit, nempe *b*

ex *a*

unam supra aliam applicamus hoc modo, *b* [supra] *a*,

et ita habetur illa pars majoris quae a minori tegi non potest, nempe *c*[313]

In multiplicatione concipimus etiam magnitudines datas sub ratione linearum; sed ex illis

fieri imaginamur: nam si multiplicemus *a*[314]

per *b*

[310] H, C, and SGZ: appellamus. A and AT: vocamus.
[311] H, C, and SGZ: examina. A and AT: examen.
[312] AT, C, and SGZ: additio. H and A: divisio. N: deeling.
[313] A, AT, C, and SGZ: nempe. Missing in H.
[314] A, AT, and C: multiplicemus. H and SGZ: multiplicamus.

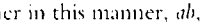
that 'the mean proportional between the magnitude assumed, which we call "the unit", and that which is designated by "a^2" is to be found', or that 'two mean proportionals between the unit and a^3 are to be found'; and the same holds for the other cases.

6. From these considerations, one easily gathers how these two operations suffice for discovering whatever magnitudes have to be deduced from others on the basis of some relation. Once we have understood these operations, it follows that we explain how they are to be presented to the examination of the imagination,[316] and how they are even to be exhibited to the eyes themselves,[317] in order that, finally, we may, later on, explain their use or practice.

7. If addition or subtraction is to be performed, then we conceive the subject in the form of a line, or in the form of an extended magnitude in which length alone is to be considered. For, if the line *a*,

is to be added to the line *b*,

then we add the one to the other in this manner, *ab*,

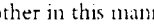


and the result is *c*:

But, if the smaller magnitude is to be taken away from the larger, namely, *b*,

from *a*,

then we place the one above the other in this manner, *b* over *a*,



and thus we obtain that segment of the larger one which the smaller one cannot cover, namely, *c*:

In multiplication, we also conceive the given magnitudes in the form of lines. But then we imagine them as forming a:

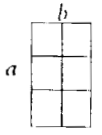
For, if we multiply *a*,

by *b*,

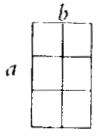
[316] Cf. R. 14, passim.
[317] Cf. R. 15, passim.

unam alteri aptamus ad angulos rectos hoc modo

et fit[315] rectangulum



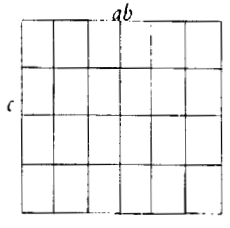
[466] ;| iterum si velimus multiplicare



per *c*

oportet concipere *ab* ut lineam, nempe *ab*

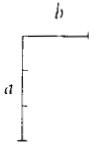
ut fiat



pro *abc*. Denique in divisione, in qua divisor est datus, magnitudinem dividendam imaginamur esse rectangulum, cujus unum latus est divisor, et aliud est quotiens: ut si rec-

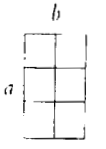
[315] A, AT, C, and SGZ: fit. H: sit.

then we fit the one line at right angles to the other, in this manner:



and the following rectangle is formed:

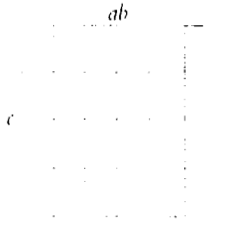
Once again, if we wish to multiply:



by *c*,

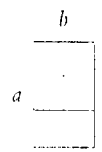
then we should conceive *ab* as a line, namely, *ab*,

in order to make the following figure for *abc*:



In division, finally, in which the divisor is given, we imagine the magnitude to be divided as being a rectangle, whose one side is the divisor and whose other side is the

tangulum



dividendum sit per *a*

tollitur ab illo altitudo *a*[316]

et remanet *b*

[467] pro quotiente; | vel contra, si idem dividatur per *b*, tolletur latitudo *b*

et quotiens erit *a*

8. In illis autem divisionibus, in quibus divisor non est datus, sed tantum per aliquam relationem designatus, ut cum dicitur extrahendam esse radicem quadratam vel cubicam etc., tunc notandum est, terminum dividendum et alios omnes semper concipiendos esse ut lineas in serie continue proportionalium existentes, quarum prima est unitas, et ultima est magnitudo dividenda. Quomodo autem inter hanc et unitatem quotcumque mediae proportionales inveniendae sint, dicetur suo loco; et jam monuisse sufficit,[317] nos supponere tales operationes hic nondum absolvi, cum per motus imaginationis indirectos et reflexos faciendae sunt;[318] et nunc agimus[319] tantum de quaestionibus directe percurrendis.

9. Quod attinet ad alias operationes, facillime quidem absolvi possunt eo modo, quo illas concipiendas esse diximus. Superest tamen exponendum, quomodo illarum termini sint praeparandi: nam etiamsi, cum primum versamur circa aliquam difficultatem, nobis liberum sit ejus terminos concipere ut lineas, vel ut [illegible]la, nec alias unquam figuras illis tribuamus, ut dictum est ad regulam decimam quartam, frequenter tamen in [468] decursu[320] rectangulum, postquam ex duarum | linearum multiplicatione fuit productum, mox concipiendum est ut linea, ad aliam operationem faciendam;[321] vel idem [illegible]lum, aut linea ex aliqua additione[322] aut subtractione producta mox concipienda est ut aliud quoddam [illegible]lum supra lineam designatam,[323] per quam est dividendum.

[316] C and SGZ: altitudo. H, A, and AT: latitudo. N: breette.
[317] H, C, and SGZ: sufficit. A and AT: sufficiat.
[318] H, C, and SGZ: sunt. A and AT: sint.
[319] AT and C: agimus. H, A, and SGZ: agemus.
[320] H, C, and SGZ: decursu. A and AT: discursu.
[321] H, C, and SGZ: faciendam. A and AT: faciendum.
[322] A, AT, C, and SGZ: additione. H: addictione.
[323] H, AT, C, and SGZ: designatam. A: designatum.

quotient. Thus, if the rectangle

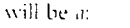
is to be divided by *a*,

then the height *a*,

is taken away from it, and there remains *b*,

as the quotient. If, on the other hand, the same rectangle is divided by *b*, then the breadth *b*,

will be taken away, and the quotient will be *a*:



8. As for those divisions, however, in which the divisor is not given, but is only indicated by some relation, such as when it is said that the square root or the cube root is to be extracted, et cetera, one has to note, in these cases, that the term to be divided, and all the other terms, are always to be conceived as lines existing in a series of continued proportionals, the first of which is the unit, and the last of which is the magnitude to be divided.[318] But, how any number of mean proportionals between this magnitude and the unit are to be found, will be said in the appropriate place.[319] It suffices, for now, to have pointed out that we are presupposing that we are not yet completely finished with such operations here, since they have to be performed by means of indirect and reverse movements of the imagination, and we are now dealing only with questions to be run through directly.

9. As far as the other operations are concerned, they can, to be sure, be very easily taken care of in the manner in which we have said that they are to be conceived. It remains to be explained, none the less, how their terms are to be prepared. For, although we are free, when first dealing with some difficulty, to conceive its terms as lines or as [illegible]'s, without ever assigning any other figures to them – as has been stated in the fourteenth rule[320] –, never the less, in the course of the operation, a rectangle, once it has been produced by the multiplication of two lines, then frequently has to be conceived as a line, for the purpose of performing some other operation. Or, once again, the same [illegible], or a line produced by some addition or subtraction, then has to be conceived as a different [illegible] drawn above the designated line by which it is to be divided.

[318] Cf. R. 18, § 5 ff.
[319] Perhaps the plan is to do this in R. 24 – cf. R. 17, § 2.
[320] Cf. R. 14, §§ 18 and 24–25.

10. Est igitur operae pretium hic exponere, quomodo omne rectangulum possit in lineam transformari, et vicissim linea aut etiam □lum in aliud □lum, cujus latus sit designatum; quod facillimum est Geometris, modo animadvertant per lineas, quoties illas[324] cum aliquo □lo comparamus, ut hoc in loco, nos semper concipere □la, quorum unum latus est longitudo illa, quam pro unitate assumpsimus. Ita enim totum[325] hoc negotium ad talem propositionem reducitur: dato □lo, aliud aequale construere supra datum latus.

11. Quod etiamsi vel Geometrarum pueris sit tritum, placet tamen exponere, ne quid videar omisisse.[326]

[324] A, AT, C, and SGZ: illas. Missing in H.
[325] A, AT, C, and SGZ: enim totum. Missing in H.
[326] H: Caetera desiderantur. L: [Caetera desiderantur]. A: *Caetera desiderantur.* N: 't Overige ontbreekt.

10. It is worthwhile, then, to explain here how every rectangle can be transformed into a line, and, conversely, how a line, or even a □, can be transformed into another □, the one side of which is specified. This is very easy for geometers, provided that they realize that, whenever we compare lines with some ▭ – as we are doing here –, we always conceive the lines as □'s, one side of which is that length which we have assumed as the unit. For, in this way, the entire affair is reduced to the following proposition: given a □, to construct, upon a given side, another rectangle equal to it.

11. Although even the school-children of the geometers are familiar with this, I still want to explain it,[421] so that I may not seem to have omitted anything.[422]

[421] In regard now to Rs. 19–21, which are stated but not explained, it is hard to see how the algebraic operations involved – having to do with both several equations and several unknowns – can be represented by means of geometrical lines. 'The picture theory of algebra' painted in R. 18 (the use of primitive geometry to illustrate rudimentary algebra) appears to be intended to validate the evidence of certain mathematical operations. But the more complicated the operation, the more convoluted the illustration. One very quickly reaches the point of diminishing returns. The tension between the desire 'to represent most graphically' and the demand 'to intuit most distinctly' (cf. R. 9, § 4) remains unresolved.

[422] At this point manuscripts indicate: 'The rest is desiderata.' In a sense, Descartes' *Geometry*, one of the *Essays* whose method is discussed in the *Discourse*, would continue some of the work begun by the *Rules*. The essay would, in turn, exert a perduring influence on the development of modern mathematics by laying the foundations of analytic geometry, i.e., by showing how geometrical figures can be analyzed algebraically. Of course, the essay is as concerned with the transposition of algebra into geometry as vice versa. For both in the *Geometry* and in the *Rules* Descartes posits that every algebraic step in an argument corresponds to a geometrical construction. Like the *Rules*, the *Geometry* posits an intimate relationship between arithmetic and geometry by indicating that certain types of geometrical problems can be reduced to the point where they require knowledge of nothing but of the lengths of lines, so that they can be solved by means of arithmetical operations (cf. AT, VI, 369 ff.). The essay also shows how the employment of abstract algebraic notation makes it possible to advance beyond the focus on numerically measured lengths in such a manner as to yield quantitatively and qualitatively better results (cf. ibid., pp. 19–20) – a move comparable to that made by those who learn to use algebraic notation in order to play chess without using either geometrical boards or physical pieces, thereby increasing exponentially their capacity for and accuracy of analysis. Now the project of displaying abstract relations in such a way as to release them from particular numerical constructions would represent a considerable piece of progress vis-à-vis previous conceptions of geometry which were strongly dependent on spatial intuitions. Yet the main aim would be to comprehend the whole of science in a unified and uninterrupted network of abstract relationships capable of application regardless of the specific subject-matter involved (cf. ibid.). Thus Descartes would have achieved, not only a *mathesis universalis*, but also a *sapientia ordine geometrico demonstrata*. On these and related developments cf. Husserl, *Die Krisis der europäischen Wissenschaften und die transzendentale Phänomenologie: Eine Einleitung in die phänomenologische Philosophie* (Husserliana vol. VI), ed. W. Biemel (The Hague, 1954), esp. § 9, and Jacob Klein, *Greek Mathematical Thought and the Origin of Algebra*, trans. E. Brann (Cambridge, MA, 1968), passim.

Regula XIX

[De desideratis]

Per hanc ratiocinandi methodum quaerendae sunt tot magnitudines duobus modis differentibus expressae, quot ad difficultatem directe percurrendam terminos incognitos pro
[469] *cognitis supponimus: ita enim tot comparationes inter duo aequalia habebuntur.* |

Regula XX

[De desideratis]

Inventis aequationibus, operationes, quas omisimus, sunt perficiendae, multiplicatione nunquam utendo, quoties divisioni erit locus.

Regula XXI

[De desideratis]

Si plures sint ejusmodi aequationes, sunt omnes ad unicam reducendae, nempe ad illam, cujus termini pauciores gradus occupabunt in serie magnitudinum continue proportionalium, secundum quam iidem ordine disponendi.[327]

Regulae XXII–XXIV

[Omnino desunt]

[327] In the margin H has the letter 'A', apparently the sign indicating the place of the text of R. 4 from 'Cum …' at the beginning of § 5 to '… transferre' at the end of § 6, which in N and in A constitutes the second part of the direct commentary on R. 4.

Rule Nineteen

[On Desiderata]

By means of this method of reasoning, as many magnitudes expressed in two different ways have to be sought as we suppose unknown terms as known for running through the difficulty directly – for thus will we obtain as many comparisons between two equal terms.[423]

Rule Twenty

[On Desiderata]

Once the equations have been found, we have to carry out the operations which we have left out,[424] *never using multiplication when division is appropriate.*[425]

Rule Twenty-One

[On Desiderata]

If there are many equations of this sort, then they all have to be reduced to a single one, namely, to that equation whose terms occupy fewer places in the series of magnitudes in continued proportion, according to which series the terms are to be arranged in order.[426]

Rules Twenty-Two through Twenty-Four

[Completely Missing]

[423] According to this rule, equations are required for all the unknown lines. For the phrase 'expressed in two different ways' seems, at least according to the *Geometry* (cf. AT, VI, 373), to mean 'expressed in equations', so that, if a problem is to be determinate, then there must be as many equations as there are unknowns.

[424] I.e., multiplication and division.

[425] According to the *Geometry*, division yields the simplest terms to which a problem can be reduced (cf. AT, VI, 374).

[426] Rules 22–36 do not appear to be extant at all, if they ever were. In conclusion, Beeckman records that, when Descartes visited him in Dordrecht on October 8, 1628, he informed him that he was 'done with arithmetic and with geometry' because in these disciplines he had grasped as much as possible for the human mind ('humanum ingenium') – and this, 'in the last nine years' ('his novem annis') or from 1619 to 1628 (cf. AT, X, 331). And, in a Letter to Mersenne of April 15, 1630, Descartes writes (AT, I, 139): 'As for the [mathematical] problems [which Mersenne had perhaps sent to Descartes], I shall send you a million of them to pose to others, if you so desire; but I am so sick and tired of mathematics, and presently so little in a position to do them, that I would no longer be able to take the trouble to solve them myself.' The *Rules for the Direction of the Natural Intelligence* had thus had their time.

LIBER III

DE QUAESTIONIBUS IMPERFECTE INTELLECTIS

Regulae XXV-XXXVI
[Omnino desunt]

FINIS[328]

[328] Cf. H, N, A, AT, C, and SGZ, where 'Finis' follows R. 21.

BOOK THREE

ON IMPERFECTLY UNDERSTOOD QUESTIONS

Rules Twenty-Five through Thirty-Six
[Completely Missing]

THE END

APPENDIX

Extrait de

La Logique ou L'Art de Penser

(Quatrième Partie, Deuxième Chapitre)

Les questions de choses se peuvent réduire à quatre principales espèces.

La première est, quand on cherche *les causes par les effets*. On sait, par exemple, les divers effets de l'aimant: on en cherche la cause. On sait les divers effets qu'on a accoutumé d'attribuer à l'horreur du vide: on recherche si c'en est la vraie cause, et on a trouvé que non. On connaît le flux et le reflux de la mer: on demande quelle peut être la cause d'un si grand mouvement et si reglé.

La deuxième est, quand on cherche *les effets par les causes*. On a su, par exemple, de tout temps que le vent et l'eau avaient grande force pour mouvoir les corps; mais les anciens, n'ayant pas assez examiné quels pouvaient être les effets de ces causes, ne les avaient point appliqués, comme on a fait depuis par le moyen des moulins, à un grand nombre de choses très utiles à la société humaine, et qui soulagent notablement le travail des hommes: ce qui devrait être le fruit de la vraie Physique. De sorte que l'on
[472] peut dire que la première sorte de questions, où l'on cherche *les causes par les* | *effets*, font toute la spéculation de la Physique; et que la seconde sorte, où l'on cherche *les effets par les causes*, en font toute la pratique.

La troisième espèce de questions est, quand *par les parties* on cherche *le tout*: comme, lorsqu'ayant plusieurs nombres, on en cherche la somme en les ajoutant l'un à l'autre; ou qu'en ayant deux, on en cherche le produit en les multipliant l'un par l'autre.

La quatrième est, quand, *ayant le tout et quelque partie*, on cherche *une autre partie*; comme, lorsqu'ayant un nombre et ce que l'on en doit ôter, on cherche ce qui restera; ou qu'ayant un nombre, on cherche quelle en sera la tantième partie.

Mais il faut remarquer que, pour étendre plus loin ces deux dernières sortes de questions, et afin qu'elles comprennent ce qui ne pourrait pas proprement se rapporter aux deux premières, il faut prendre le mot de *partie* plus généralement, pour tout ce que comprend une chose, ses modes, ses extrémités, ses accidens, ses propriétés et généralement tous ses attributs: de sorte que ce sera, par exemple, chercher un tout par ses parties, que de chercher l'aire d'un triangle par sa hauteur et par sa base; et ce sera, au contraire, chercher une partie par le tout et une autre partie, que de chercher le côté d'un rectangle par la connaissance qu'on a de son aire et de l'un de ses côtés.

Extract from

The Logic or The Art of Thinking

(Part Four, Chapter Two)

The questions concerning things can be reduced to four principal sorts.

In the first sort of question, one seeks the causes by way of the effects. For example, one knows the various effects of the magnet, and one seeks the causes of them; or one knows the various effects which one has grown accustomed to attribute to the horror of a vacuum, and one inquires whether this is the true cause of them – one has found that it is not; or one is familiar with the ebb and flow of the tide, and one asks what can be the cause of such a great and regular movement.

In the second sort of question, one seeks the effects by way of the causes. For example, one has always known that wind and water can move bodies with great force; but the ancients, not having sufficiently examined what the effects of these causes could be, did not thus apply them, as one has since applied them, by means of mills, to a great number of things that are very useful to human society and that render the work of human beings noticeably easier – which ought to be the yield of the true physics. As a result, one can say that the first sort of question, in which one seeks the causes by way of the effects, makes up the whole of theoretical physics, and that the second sort of question, in which one seeks the effects by way of the causes, makes up the whole of practical physics.

In the third sort of question, one seeks the whole by way of the parts, such as, for example, when, having several numbers, one seeks the sum of them by adding them together, or when, having two of them, one seeks the product of them by multiplying them together.

In the fourth sort of question, one seeks a part of the whole, given the whole and some other part, such as when, given a number and another number to be subtracted from it, one seeks the remainder; or when, given a number, one tries to find out what such and such a part of it will be.

But it is necessary to note that, in order to extend the scope of the latter two sorts of questions, and so that they include that which could not properly be brought under the former two sorts, the word 'part' has to be taken more generally, as all that which composes a thing – its modes, its extremities, its accidents, its properties, and all its attributes generally. As a result, one will be seeking a whole by way of its parts when, for example, one seeks the area of a triangle by way of its height and its base; and, on the other hand, one will be seeking a part by way of the whole and another part when one seeks the side of a rectangle by way of the knowledge that one has of its area and of one of its sides.

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tenebrae, -arum, f. (shadows, darkness): 371, 401, 442
tenuis, -e, adj. (thin, fine): 424
tenuitas, -atis, f. (thinness, fineness): 378
termino, -avi, -atum, -are (to terminate, to limit, to bound): 368
terminus, -i, m. (term, limit, bound): 408, 418, 430, 432, 440, 445, 453, 455, 457–459, 460, 464, 467–469
terra, -ae, f. (the earth, earth, land): 424, 436–437
tetraedrum, -i, n. (tetrahedron, four-faced polyhedron): 449
texo, texui, textum, -ere (to weave, to interweave): 404
textura, -ae, f. (texture, cloth, fabric): 404
thesaurus, -i, m. (thesaurus, treasury, storehouse): 371
Theseus, -ei, m. (Theseus): 380
timeo, -ui, -ere (to fear): 367, 376
tingo, tinxi, tinctum, -ere (to color): 423
titulus, -i, m. (title): 403
tormenta, -orum, n. (war machine, catapult, torture, torture device): 363
totum, -i, n. (totality, whole): 411, 428, 433, 448, 462
totus, -a, -um, adj. (total, whole): 359, 365, 379, 381–382, 385, 387–391, 394–395, 398–402, 404, 407–409, 414–415, 419–420, 430, 433, 436, 438, 440, 444, 452, 455, 460–462, 468
tractatus, -us, m. (treatise, treatment): 373, 381, 392, 399, 432, 459
tracto, -avi, -atum, -are (to treat, to handle): 379, 399, 430, 441, 451–452
transfero, transtuli, translatum, transferre (to transfer, to carry over, to use metaphorically): 369, 379, 406, 415, 435, 438–439, 441
transformo, -avi, -atum, -are (to transform): 468
transitus, -us, m. (transit, transition): 414
transmigro, -avi, -atum, -are (to transmigrate, to move from … to …): 414
transmutatio, -onis, f. (transmutation): 360
transpositio, -onis, f. (transposition): 391
trapezium, -i, n. (trapezium, quadrilateral with no parallel sides): 449
triangularis, -e, adj. (triangular): 450
triangulus, -i, m., and triangulum, -i, n. (triangle): 368, 422, 449, 451, 456–458
tripes, -pedis, adj., and subst., m. (three-footed, tripedal animal): 433
turbo, -avi, -atum, -are (to confuse, to disturb): 361, 423, 456, 460, 463
turpis, -e, adj. (base, reprehensible): 360
tyro, -onis, m. (a beginner in learning something [tiro = recruit]): 393

unio, -onis, f. (union): 421
unitas, -atis, f. (unity): 419, 445, 447, 449, 451–455, 457, 459, 462–464, 467–468
universalis, -e, adj. (universal): 360, 378–379, 381–382
universitas, -atis, f. (universe, world): 398
universum, -i, n. (universe, world): 442
usitatus, -a, -um, part. adj. (usual, common): 464
usurpo, -avi, -atum, -are (to use, to usurp): 369
usus, -us, m. (use, employment, application): 359–360, 365, 369, 378–380, 397, 401, 409, 429, 432–433, 442, 445, 452, 454, 457, 464
utilis, -e, adj. (useful, purposeful): 361, 373, 376, 381, 392, 397, 404, 407, 412, 430, 455
utilitas, -atis, f. (utility, usefulness, purposefulness): 373, 378, 408–409, 442
utor, usus sum, uti (to use, to employ, to apply): 366, 369, 372–373, 375, 382, 389, 395, 397, 400, 403, 406, 410–411, 435, 437–438, 440, 442–443, 445, 450–451, 455, 459, 461–462, 469

vacuum, -i, n. (vacuum, empty space): 424
vagor, -atus sum, -ari (to wander, to stray, to be fuzzy): 371
vagus, -a, -um, adj. (vague, confused, unclear): 403, 427, 434
vanus, -a, -um, adj. (empty, vain): 375, 405
varietas, -atis, f. (variety, diversity, plurality): 360, 394
vas, vasis, n. (vase, vessel, bowl): 435–437
verbum, -i, n. (word, expression): 364, 369, 393, 402, 404, 413, 418, 426, 428, 431, 433–434, 439, 443–445, 448, 450, 455, 457
vereor, -ritus sum, -eri (to fear, to be afraid): 428, 442, 446
veritas, -atis, f. (truth): 360–361, 366–367, 371, 374, 376, 379–381, 384, 387, 389, 393–401, 403, 405–406, 410–412, 424–425, 428, 439–440, 443, 447
verum, -i, n. (the true): 361, 364, 372, 406, 432
verus, -a, -um, adj. (true): 359, 362–363, 367–369, 371–372, 375–377, 388–389, 394, 398, 414, 417, 420–421, 423–424, 427–428, 431–432, 435, 438, 441–442, 444–446, 459, 461
vestigium, -ii, n. (vestige, trace): 364, 376
vestio, -ivi and -ii, -itum, -ire (to clothe, to be clothed): 374, 421
vetus, veteris, adj., and subst., m. (ancient, one who is ancient): 373
via, -ae, f. (path, way): 360, 364, 370–372, 375, 386, 389–390, 396, 399, 401, 405, 425, 460
viator, -oris, m. (traveler, passer-by): 371
video, vidi, visum, -ere (to see): 359–363, 365, 367–369, 371–373, 375–377, 379–381, 384, 386–389, 391, 393, 395–399, 401–402, 407–411, 413, 415–418, 423, 426–428, 430, 433–438, 440, 442, 451, 454, 456–457, 468
vinculum, -i, n. (bond, chain, fetter, link): 365, 389, 406, 419
vir, viri, m. (man): 363, 377
virtus, -utis, f. (virtue, power, strength): 376, 398, 437
vis, vim (acc.), f. (force, power, strength): 360, 376, 402, 406, 412, 414–416, 426, 428
visus, -us, m. (vision, sight, sense of sight): 424
vita, -ae, f. (life): 361, 391, 395–396, 398, 428
vitium, -ii, n. (vice, mistake, shortcoming, drawback): 362, 364, 401, 423
vivo, vixi, victum, -ere (to live): 376, 449
vocabulum, -i, n. (designation, name, term): 369, 378, 431, 440, 444–445, 447
voco, -avi, -atum, -are (to call, to name, to designate): 373, 377, 381, 393, 414, 416, 418, 433, 456–457, 464
volitio, -onis, f. (volition, act of the will): 419
voluntas, -atis, f. (will): 361, 370, 419
voluptas, -atis, f. (pleasure): 361, 376, 403
vox, vocis, f. (voice, expression, word, meaning): 369, 377, 443
vulgaris, -e, adj. (vulgar, common, widespread): 367, 369, 374, 376, 406, 442, 456
vulgo, -avi, -atum, -are (to vulgarize, to popularize): 376
vulgus, -i, n. and m. (the [common] people, the many, the vulgar): 360, 374

ENGLISH–LATIN GLOSSARY

able: potens
absolute: absolutus
absolutely: absolute
abstain: abstinere
abstract (adj.): abstractus
abstract (v.): abstrahere
abuse: abuti
accident: casus
accurate: accuratus
accurately: accurate
acknowledge: agnoscere
acquainted, be ... with: noscere
act: actus
action: actio
activity: negotium
add: addere
addition: additio
admiration: admiratio
adorn: ornare
affirm: affirmare (cf. aio)
age: aetas, saeculum
agree: consentire
aid: adjumentum
air: aër
algebra: algebra
alien: alienus
alter: mutare
ambiguities: ambages
ambiguity: ambiguitas
anaclastic (line): anaclastica
anagram: anagramma
analogy: analogia
analysis: analysis
ancient: vetus
ancients: antiqui
angle: angulus
animal (adj.): brutus
animal (n.): animal
animate(d): animatus
animus: animus
antiquity: antiquitas
anvil: incus
appear: apparere
apply: applicare
apprehend: apprehendere
apt: aptus
area: area
argument: argumentum
arise: nasci
Aristotle: Aristoteles
arithmetic: arithmetica
arithmetical: arithmeticus
arithmeticals: arithmetica
arithmetician: logista
art: ars
artfully: artificiose
artifice: artificium
artificer: artifex
ask: petere
assistance: auxilium
assume: assumere
assumed: assumptitius
astrologer: astrologus
astronomer: astronomus
astronomy: astronomia
attempt: periculum
attend to: attendere
attention: attentio
attentive: attentus
attentively: attente
augur: augurari
author: auctor
authority: auctoritas
aware: conscius
axis: axis

backwards: praeposterus
bad: malus
barbaric: barbarus
base (adj.): turpis
base (n.): basis
beast: bellua
beginner: tyro
beginning: initium
being: ens
believable: credibilis
believe: credere
benefit: beneficium
biped: bipes
bird: avis
birth: nativitas
blind: caecus
blind, be: caecutire
blood: sanguis
blue: caeruleus
bodily: corporeus

body: corpus
bond: vinculum
bone: os
book: liber
born, be: nasci
bound (n.): limes
bound (v.): terminare
brain: cerebrum
breadth: latitudo
break the habit of: desuescere
brief: brevis
briefly: breviter
broad: latus
brute: brutus
build: fabricare
building: aedificium
business: negotium

calculation: supputatio
call: vocare
capable: capax
capacity: capacitas
care: cura
carpet: tapes, tapetum
case: casus
category: categoria
cause: causa
center: centrum
certain: certus
certainly: certe, certo
certainty: certitudo
chain: catena
change (n.): (im)mutatio
change (v.): (im)mutare
character: character
chemist: chymista
child (young man): puer
childish: puerilis
choice: arbitrium
circle: circulus, orbis
circularly: circulariter
circumscribe: circumscribere
clarify: erudire
class: classis
clear: clarus
clearly: clare
cloth: tela
clothe, be clothed: vestire
cogitate: cogitare
cogitation: cogitatio
cognition: cognitio
cognize: cognoscere
cold: frigus
collect: colligere
collection: collectio
color (n.): color
color (v.): tingere
column: columna
commensurable: commensurabilis
common: communis
communicate: communicare
compare: comparare
comparison: comparatio
complete: completus
completion: complementum
complex: complexus
complicated: involutus
compose: componere
composite: compositus
composition: compositio
comprehend: comprehendere
concatenation: catenatio
conceive: concipere
concept: conceptus
conception: conceptus
conclude: concludere
conclusion: conclusio
condemn: damnare
condition: conditio
confident: confidens
confidently: confidenter
conflict (n.): lis
conflict (v.): repugnare
confound: confundere
confuse: confundere
confused: confusus
confusedly: confuse
conjecture (n.): conjectura
conjecture (v.): conicere
conjunction: conjunctio
connect: connectere
connection: connexio
conscious: conscius
consciousness: cogitatio
consent: consentire
consequence: consequentia
consequently: consequenter
consider: considerare
consideration: consideratio
constant: constans
constitute: constituere
construe: construere

contemplate: contemplari
contemplation: contemplatio
context: contextus
contingent: contingens
continued: continuus
continuous: continuus
continuously: continue
contradict: repugnare
contrived: commentitius
controversial: controversus
controversy: controversia
convey: communicare
convince: persuadere
corporeal: corporeus
correct: emendare
correlative: correlativus
correspond: correspondere
corrupt: corrumpere
count: numerare
cover: tegere
covering: integumentum
credible: credibilis
credulity: credulitas
crown: corona
crude: rudis
cube: cubus
cubed: cubicus
cubic: cubicus
cultivate: erudire
curiosity: curiositas
curious: curiosus
custom: consuetudo

danger: periculum
dangerous: periculosus
daughter: filia
day: dies
deceive: decipere, fallere
deception: deceptio
deceptive: fallax
deduce: deducere
deduction: deductio
deep: profundus
defect: defectus
defective: defectivus
define: definire
definition: definitio
deliberate: deliberare
deliberation: consilium
demonstrate: demonstrare
demonstration: demonstratio
deny: negare
depend: dependere
dependence: dependentia
dependent: dependens
dependently: dependenter
depict: depingere
depth: profunditas
describe: describere
designate: designare
designation: vocabulum
desire: cupiditas
determination: determinatio
determine: determinare
develop: evolvere
dialectic: dialectica
dialectician: dialecticus
differ: differre
difference: differentia
difficult: difficilis
difficulty: difficultas
difficulty, with: difficile
dignity: dignitas
diligence: diligentia
diligent: diligens
diligently: diligenter
dimension: dimensio
Diophantus: Diophantus
dioptrics: dioptrica
direct (adj.): directus
direct (v.): dirigere
direction: directio
directly: directe
discern: dignoscere
discipline: disciplina
discover: invenire
discovered, the: inventum
discoverer: inventor
discovery: inventio
discrimination: discrimen
discursive reasoning: discursus
disorderly: inordinatus
disposed: propensus
disposition: dispositio
dispute (n.): lis
dispute (v.): disputare
dissent: dissentire
distinct: distinctus
distinction: distinctio
distinctly: distincte
distinguish: distinguere
disturb: turbare

diversity: diversitas
divide: dividere
divine (adj.): divinus
divine (v.): divinare
divinely: divinitus
division: divisio
divisor: divisor
doctrine: doctrina
doubt (n.): dubitatio
doubt (v.): dubitare
doubtful: dubius
doubtful, the: dubium
doubtfully: dubie
duration: duratio

ear: auris
earth: terra
ease: facilitas
easily: facile
easy: facilis
effect (n.): effectus
effect (v.): efficere
effectuate: efficere
effigy: effigies
effort: opera
emend: emendare
empty: inanis
emulation: aemulatio
encompass: complecti
end: finis
endeavor (n.): conatus
endeavor (v.): conari
endless: infinitus
endow: instruere
enigma: aenigma
enumerate: enumerare
enumeration: enumeratio
equal: aequalis, aequus
equality: aequalitas
equally: aequaliter, aeque
equation: aequatio
equivocally: aequivoce
err: errare
err about: oberrare
err off: aberrare
error: error
erudite: eruditus
erudition: eruditio
ether: aether
event: casus
evidence: evidentia
evident: evidens
evidently: evidenter
evolve: evolvere
exactly: exacte
examination: examen
examine: examinare
example: exemplum
exceed: excedere
excogitate: excogitare
exercise (n.): exercitium
exercise (v.): exercere
exist: ex(s)istere
existence: existentia
expect: sperare
expectation: spes
experience (n.): experientia
experience (v.): experiri
experiment: experimentum
explain: explicare
explanation: explicatio
explicate: explicare
explication: explicatio
express: exprimere
expression: verbum
extend: extendere
extended: extensus
extension: extensio
external: externus
extremity: extremitas
exultation: exsultatio
eye: oculus

fabric: tela
fabricate: fabricare
fabricated: commentitius
facile: facilis
facility: facilitas
faculty: facultas
faith: fides
fall: delabi
fallacious: fallax
false: falsus
false, the: falsum
falsity: falsitas
fame: fama
family (tree): prosapia
fantasy: phantasia
farmer: rusticus
fashion: mos
father: pater
fault: culpa

fault, be at: peccare
fear (n.): metus
fear (v.): timere, vereri
feature: nota
feign: (ef)fingere
fetter: vinculum
field: ager
figure (n.): figura
figure (v.): figurare
figured: figuratus
find: invenire
firmly: firmiter
first and foremost: praecipuus
firstly and foremostly: praecipue
fish: piscis
fisher: piscator
fishhook: hamus
fishing-pole: arundo
fist: mars
fitting: aptus
flow: fluxus
fog: nebula
follow: (con)sequi
following: (con)sequens
font: fons
foot: pes
force: vis
form (n.): forma
form (v.): formare
fortunate: felix
fortunately: feliciter
fortune: fortuna
foundation: fundamentum
free: liber
freedom: libertas
freely: libere
fruit: fructus, frux
fruitfulness: felicitas
function: functio
future: futurus

game: ludibrium
gather: cogere
general: generalis
generally: generaliter
generation: nativitas
genus: genus
geometer: geometra
geometrical: geometricus
geometricals: geometrica
geometry: geometria
get used to: assuescere
Gilbert: Gilbertus
glance: frons
globe: globus
glory: gloria
God: Deus
golden: aureus
good: bonus
govern: regnare
grade: gradus
gradually: gradatim
grasp: captus
group: collectio
grow: cresco
guess (n.): conjectura
guess (v.): conicere

habit: habitus
habituate oneself: consuescere
habituation: habitus
hand: manus
happen: accidere, contingere
hard: durus
harp: cithara
head(ing): caput
healthy: sanus
hear: audire
heat: calor
heavens: caelum, coelum
heavy: gravis
height: altitudo
helmet: cassis
help: ops
hidden: occultus
hide: tegere
high: altus
historian: historicus
history: historia
hope (n.): spes
hope (v.): sperare
hour: hora
human: humanus
human being: homo
humanly: humanitus
humor: humor

I: ego
idea: idea
ignorance: ignorantia
ignorant, be ... of: ignorare
illumination: illuminatio

image: imago
imaginable: imaginabilis
imaginary: imaginarius
imagination: imaginatio
imagine: imaginari
imitate: imitari
imitation: imitatio
immediately: immediate
immense: immensus
immobile: immobilis
impediment: impedimentum
imperfect: imperfectus
imply: implicare
impress: imprimere
impression: impressio
imprudently: imprudenter
impulse: impulsus
inadvertence: inadvertentia
incidence: incidentia
incommensurable: incommensurabilis
incorrectly: perperam
incredible: incredibilis
independent: independens
index: index
indirect: indirectus
indirectly: indirecte
individual: individuus
indivisible: individuus
indubitable: indubitatus
induction: inductio
industrious: industrius
industriousness: industria
inept: ineptus
inexperience: imperitia
inexperienced: inexpertus
inexplicable: inexplicabilis
infancy: infantia
infant: infans
infer: inferre
inference: illatio
infinite: infinitus
influence: influxus
inform: informare
ingenious: ingeniosus
ingeniously: ingeniose
initiative: mars
innate: ingenitus
innumerable: innumerus
inquire: inquirere
insane: insanus
inseparable: inseparabilis
insignificant: levis
inspect: inspicere
inspection: inspectio
instant: instans
instruct: instruere
instrument: instrumentum
integral: integer
intellect: intellectus
intellectual: intellectualis
intelligence (natural): ingenium
interior: intimus
intermediate: intermedius
interpret: interpretari
interpretation: interpretatio
intersect: intersecare
intricate: intricatus
intrinsic: intrinsecus
intuit: intueri
intuition: intuitus
invent: invenire
invention: inventio
inventor: inventor
investigate: investigare
investigation: investigatio
iron: ferrum

jaundiced: ictericus
join: jungere
join by the copula: copulare
join together: conjungere
joy: oblectatio
judge: judicare
judgment: judicium
Jupiter: Juppiter
justification: jus
juxtapose: obicere

kind: gens
knot: nodus
know: scire
knowledge: scientia
known: notus
know not: nescire

laboriously: laboriose
labyrinth: labyrinthus
land: terra
lapse: delabi
Latin, in: Latine
lead: ducere
leader: dux

leadership: ductus
leap: saltus
learn: (ad)discere
learned: doctus
legitimate: legitimus
leisure: otium
leisurely: otiosus
length: longitudo
letter(s): littera(e)
level: gradus
license: licentia
life: vita
light: lumen, lux
likeness: effigies
limit (n.): limes
limit (v.): limitare
line: linea
link: an(n)ulus
lip: labrum
literate: litteratus
live: vivere
local: localis
long: longus
lord: dominus

machine: machina
magic: magicus
magnet: magnes
magnitude: magnitudo
mallet: malleus
man: vir
manifold: multiplex
manner: mos
many: multi
many, the: vulgus
mark (n.): nota
mark (v.): notare
mass: massa
master: magister
material: materialis
mathematical: mathematicus
mathematician: mathematicus
mathematics: mathematica
mathesis: mathesis
matter: materia
maturity: maturitas
mean (adj.): medius
mean (n.): medium
measurable: mensurabilis
measure (n.): mensura
measure (v.): dimetiri
mechanical: mechanicus
mechanical things: mechanica
mechanics: mechanica
meditation: meditatio
melancholy: melancholicus
member: membrum
memory: memoria
metal: metallum
method: methodus
mind: mens
Minerva: Minerva
mislead: decipere
mixture: mixtura
mode: modus
modest: modestus
momentum: momentum
moon: luna
mortal: mortalis
motive ('*motive* force'): motrix
mouth: os
move: movere
multiple: multiplex
multiplication: multiplicatio
multiply: multiplicare
multitude: multitudo
music (Muses' arts): musica
mystery: mysterium

naked: nudus
name (n.): nomen
name (v.): nominare
natural: naturalis
nature: natura
necessarily: necessario
necessary: necessarius, necesse
necessity: necessitas
needle: acus
needle point: acus
negate: negare
negation: negatio
nerve: nervus
new: novus
nexus: nexus
no one: nemo
noble: nobilis
node: nodus
nose: nares
note (n.): nota
note (v.): notare
noted: notus
notice (n.): animadversio

notice (v.): animadvertere
notion: notio
number (n.): numerus
number (v.): numerare

oath: sacramentum
object: objectum
obligation: officium
oblique: obliquus
obscure (adj.): obscurus
obscure (v.): obscurare
obscurity: obscuritas
observation: observatio
observe: (ob)servare
obvious: obvius
occasion: occasio
odor: odor
old person: senex
omission: omissio
omit: omittere
opaque thing: opacum
open: apertus
openly: aperte
operation: operatio
opinion: opinio
opinion, be of the: opinari
optics: optica
order (n.): ordo
order (v.): ordinare
origin: nativitas
originate: nasci

pain: dolor
paint: pingere
paper: charta
Pappus: Pappus
parallel: parallelus
portion: portio
part: pars
participant: particeps
participate: participare
particular (adj.): particularis
particular (n.): particulare
passivity: passio
path: via
Paul: Paulus
peasant: rusticus
peculiar: peculiaris
pen: calamus
penetrate: penetrare
penetration: penetratio
per se: per se
perceive: percipere
perfect (adj.): perfectus
perfect (v.): perficere
perfection: perfectio
perfectly: perfecte
periphery: peripheria
pernicious: perniciosus
perpetual: perpetuus
perpetually: perpetuo
perspicacious: perspicax
perspicacity: perspicacitas
perspicuity: perspicuitas
perspicuous: perspicuus
perspicuously: perspicue
persuade: persuadere
perverse: perversus
Peter: Petrus
phantasm: phantasma
phenomenon: phaenomenon
philosopher: philosophus
philosophical: philosophicus
philosophize: philosophari
philosophy: philosophia
physician: medicus
physicist: physicus
physics: physica
picture (n.): imago
picture (v.): imaginari
pillar: columna
place: locus
plant: planta
Plato: Plato
play (n.): lusus
play (v.): ludere
pleasure: voluptas
point: punctum
poor (person): pauper
popular: vulgaris
popularize: vulgare
position: situs
positioned: situs
potency: potentia
power: potestas
practice: praxis
praise: laudare
praxis: praxis
precept: praeceptum
precisely: praecise
prediction: praedictio
prejudice: praejudicium

preparation: praeparatio
prepare: praeparare
prerequire: praerequirere
prescribe: praescribere
present: praesens
presume: praesumere
presuppose: praesupponere
pretty: pulcher
primary: primarius
principle: principium
priority, give ... to: praecipere
privation: privatio
probable: probabilis
probably: probabiliter
problem: problema
produce: producere
profit: lucrum
progress (n.): progressus
progress (v.): progredi
prohibit: prohibere
proper: proprius
properly: proprie
property: proprietas
prophesy: hariolari
proportion: proportio
proportional: proportionalis
proposal: propositum
propose: proponere
proposition: propositio
prove: probare
prudent (person): prudens
puerile: puerilis
pure: purus
purely: pure

quadruped: quadrupes
quality: qualitas
quantity: quantitas
query: petitio
question: quaestio

radius: radius
rashly: temere
rashness: temeritas
ratiocinate: ratiocinari
ratiocination: ratiocinatio
rational: rationalis
rationally: rationabiliter
read: legere
reader: lector
reading: lectio
real: realis
really: realiter
reason: ratio
reasonable: rationalis
recall: revocare
reckoning: calculus
recognize: cognoscere
recollection: recordatio
recruit: tyro
rectangle: rectangulum
rectangular: rectangulus
rectilinear: rectilineus
red: ruber
reduce: reducere
reflect: reflectere
refraction: refractio
regard: spectare
regular: regularis
reject: reicere
relation: habitudo, relatio
relative (adj.): respectivus
relative (n.): respectivum
remedy: pharmacum, remedium
remember: meminisse
render firm: firmare
render infirm: infirmare
repeat: repetere
represent: repraesentare
reputation: fama
require: requirere
resolution: resolutio
resolve: resolvere
respect: respectus
respectable, the: honestum
respective (adj.): respectivus
respective (n.): respectivum
rest: quies
reveal: revelare
review: recensere
rhetoric: rhetorica
rich (person): dives
right: jus
rigidly: rigide
rigorous: strictus
rigorously: stricte
rivalry: aemulatio
river: flumen
rock: saxum
rod: ferula
root: radix
rudiment: rudimentum

rule (n.): regula
rule (v.): regere
run through: percurrere
rush: scirpus

sagacious: sagax
sagaciously: sagaciter
sagacity: sagacitas
saving(s): compendium
scale(s): libra
scholastic: scholasticus
school: schola
science: scientia
script: scriptura
scrutinize: perscrutari
seal: sigillum
secret (adj.): secretus
secret (n.): secretum
secure: securus
see: videre
see through: perspicere
seed: semen
seek: quaerere
selection: delectus
sense (n.): sensus
sense (v.): sentire
sensible: sensibilis
sentence: sententia
separate: separare
series: series
serious: serius
seriously: serio
set: collectio
shadows: tenebrae
shaky: labilis
shape (n.): figura
shape (v.): figurare
shaped: figuratus
sharpness of wit: acumen
shore: litus
short: compendiosus
show: ostendere
sickness: morbus
side: latus
sight: visus
sign: signum
signification: significatio
signify: significare
silver: argenteus
similitude: similitudo
simple: simplex
simplicity: simplicitas
simply: simpliciter
single: singulus
singular: singularis
slight: exiguus
slip (n.): lapsus
slip (v.): labi
slowness: tarditas
slyness: astutia
smithery (pertaining to): fabrilis
Socrates: Socrates
solid (adj.): solidus
solid (n.): solidum
solidly: solide
solitary: solitarius
solution: solutio
solve: solvere
son: filius
sophism: sophisma
sophist: sophista
soul: anima
sound (adj.): sanus
sound (n.): sonus
soundly: sane
source: origo
space: spatium
speak: loqui
species: species
speech: oratio, sermo
speed: celeritas
Sphinx: Sphinx
spirit: spiritus
spiritual: spiritualis
spontaneous: spontaneus
square (adj.): quadratus
square (n.): quadratum
square of square: biquadratum
stable: stabilis
staff: baculum, baculus
stain: macula
stair(s): scala
star: astrum, sidus
statuette: sigillum
step: gradus
sterile: sterilis
stone: lapis
story: fabula
strange: alienus
street: platea
strict: strictus
strictly: stricte

strive: conari
striving: conatus
stubbornly: pertinaciter
student: studiosus
study (n.): studium
study (v.): studere
subject (n.): subjectum
subject (v.): subicere
sublime: sublimis
subordinate: subordinare
substance: substantia
subtle: subtilis
subtraction: subtractio
succession: successio
successively: successive
suffer: pati
suffice: sufficere
sufficient: sufficiens
sufficiently: sufficienter
sum: summa
summit: fastigium
sun: sol
superficial: superficiarius
superfluous: superfluus
supplies: copia
support: ministerium
suppose: supponere
supposition: suppositio
suppress: supprimere
surface of the skin: cutis
surface: superficies
survey: perlustrare
susceptible (to error): obnoxius
suspect (adj.): suspectus
suspect (v.): suspicari
swift: celer
swiftly: celeriter
swiftness: celeritas
sword: ensis
syllogism: syllogismus
symbol: nota
symbolize: notare

Tantalus: Tantalus
tapestry: tapes, tapetum
task: negotium
taste: sapor
teach: docere
teacher: doctor, magister
teaching: doctrina
tediousness: taedium
tending: propensus
tension: tendere
term: terminus
terminate: terminare
test: periculum
tetrahedron: tetraedrum
texture: textura
thanksgiving: sacrificium
therefore: ergo
Theseus: Theseus
thin: tenuis
thing: res
think: cogitare, putare
think of: excogitare
thinness: tenuitas
thread: filum
threads: tela
three-footed animal: tripes
threshold: limen
time: tempus
title: titulus
tongs: forceps
tongue: lingua
torture device: tormenta
total: totus
totality: totum
touch (n.): tactus
touch (v.): tangere
trace: macula
transfer: transferre
transform: transformare
transit: transitus
transmigrate: transmigrare
transmutation: transmutatio
transparent body: diaphanum
transposition: transpositio
trapezium: trapezium
traveler: viator
treasury: thesaurus
treat: tractare
treatise: tractatus
tree: arbor
triangle: triangulus, triangulum
triangular: triangularis
trivialities: nugae
true: verus
true, the: verum
trust: confidere
truth: veritas
turn toward: advertere

uncertain: incertus
uncertainty: incertitudo
understand: intelle[i]gere
undertaking: institutum
undivided: indivisus
unequal: inaequalis
unfitting: ineptus
unfruitful: infelix
union: unio
unity: unitas
universal: universalis
universe: universitas, universum
unknowing: ignarus
unknown: ignotus
unlearned: indoctus
unmoved: immotus
unrecognized: incognitus
unregulated: inconditus
unwilling: invitus
use (n.): usus
use (v.): uti
useful: utilis
useless: inutilis
uselessly: inutiliter
usual: usitatus
utility: utilitas
utterance: enuntiatio

vacuum: vacuum
vague: vagus
vain: vanus
value: pretium
variety: varietas
vessel: vas
vestige: vestigium
vice: vitium
virtue: virtus
vision: acies
voice: vox
volition: volitio
vote: suffragium
vulgar (adj.): vulgaris
vulgar (n.): vulgus
vulgarize: vulgare

walking-stick: scipio
wander: vagari
war: bellum
war machine: tormenta
water: aqua
wax: cera
way: iter
weak: infirmus
weakness: infirmitas
wealth: divitiae
weave: texere
weight: gravitas, pondus
wheel: rota
white: albus
wide: latus
width: latitudo
will: voluntas
wisdom: sapientia
wise (person): sapiens
withhold: cohibere
woman: mulier
wonder (n.): miraculum
wonder (v.): mirari
wonderful: mirus
wood: lignum
word: verbum
work (n.): labor
work (v.): laborare
write: scribere
writer: scriptor
writing: libellus

year: annus
yellow: flavus

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